THE DOCK & HARBOUR AUTHORITY

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Editorial Comments.

THE JUNIOR INSTITUTION OF ENGINEERS.

At the weekly meeting held on Friday, the 14th December, Mr. E. J. H. South, Member, read a paper describing the advantages to be gained by washing out the boilers of locomotives with hot water instead of the much more general method by means of cold water, adopted in England. He stated that Locomotive boilers were peculiarly susceptible to become furred and enrusted due firstly to the rapid evaporation, and secondly, to the use of water obtained from different sources in various parts of the country, and although plants for softening and treating water were installed at a great many of the large stations and locomotive sheds up and down the country, there were hundreds of branch and local lines which had no such installation.

The advantages of using hot water were threefold. First, it did not impose that strain on the structure of the boiler which it was contended resulted if cold water was introduced to a boiler not sufficiently cooled after its contents had been blown off; secondly, it enabled a saving of several hours in the time taken to blow out, wash, refill and generate steam and thus enabled a smaller number of engines to do a given amount of work and thirdly, by modern systems, the hot water remaining in a locomotive boiler sent to the sheds for washing down was not blown to waste but used to heat the water used in refilling the boiler after washing.

The saving in the time during which an engine was out of steam due to washing was shown by a table of comparative tests on engines of various types, the figures in some cases showing a saving of sixteen hours in the time the engine was off duty for washing out.

SHIPPING TRAFFIC AT HAMBURG IN NOVEMBER, 1928.

According to a report received by the Department of Overseas Trade from His Majesty's Consul-General at Hamburg the total tonnage entered and cleared at the port in November was approximately the same as in October. British shipping in November consisted of 202 vessels (400,248 tons) entered and 195 vessels (365,340 tons) cleared compared with 209 vessels (384,584 tons) entered and 205 vessels (376,047 tons) cleared in October.

German tonnage in November amounted to 808,651 tons entered (780,568 tons in October) and 787,680 tons cleared (806,151 tons in October).

Personal enquiries regarding shipping and transport matters should be made at the City Office of the Department (Shipping and Transport Section), 73, Basinghall Street, London, E.C.2.

IMPORTANT AMALGAMATION.

Messrs. Vickers, Vickers-Armstrongs and Cammell Laird announce that two agreements have been concluded subject to certain consents which have yet to be obtained.

The first agreement, to which all three firms are parties, provides for the amalgamation of the whole of their steel interests with the exception of those concerned with guns, gun mountings and armoured cars and tanks.

A new Company to be called the English Steel Corporation Ltd. will be formed for the purpose of taking over these steel interests which are as follows:—

(a) From Vickers-Armstrongs:—River Don Works, Sheffield (with the exception of certain gun making plant and plant for armoured cars and tanks); Attercliffe Works, Sheffield; Holme Lane Works, Sheffield; Openshaw Works, Manchester (with the exception of the gun mounting plant); The plant for drop forgings at Elswick.

(b) From Vickers Limited:—The Ordinary Shares in Taylor Bros. and Co. Ltd. Steel Tyre, Axle and Wheel Manufacturers of Trafford Park, Manchester.

(c) From Cammell Laird and Co., Ltd.:—Cyclops Steel and Iron Works, Sheffield; Grimesthorpe Works, Sheffield; The Yorkshire Steel and Iron Works, Penistone.

Negotiations are also in progress for including in the new company other important Firms in the Steel Industry.

The second agreement to which Vickers Ltd. and Cammell Laird and Co. Ltd. are parties provides for the amalgamation of all the Railway Carriage and Wagon interests of the two Companies. For this purpose the name of the Metropolitan Carriage Wagon and Finance Co. Ltd. which is a subsidiary of Vickers, will be changed to the Metropolitan Cammell Carriage, Wagon and Finance Co., Ltd., and the Carriage and Wagon interests of Cammell Laird will be transferred to it.

The Metropolitan Cammell Carriage, Wagon and Finance Co. Limited will therefore comprise the following:—

(1) From Vickers Limited:—The Metropolitan Carriage Wagon and Finance Co.; The Patent Shaft and Axletree Co.; The Willingsworth Iron Co.

(2) From Cammell Laird and Co. Limited:—The Nottingham Factory; their interest (which includes practically the whole of the issued Ordinary Shares) in the Midland Railway Carriage and Wagon Co. Limited and in the Leeds Forge Co. Limited.

It should be noted that these agreements cover only the Steel and Railway Carriage and Wagon interests of Messrs. Vickers, Vickers Armstrongs and Cammell Laird, and that their other activities are unaffected and will be carried on as heretofore.

THE PORT OF HAVRE.

We have taken for the subject of this month's supplement the latest facilities which have been completed at the Port of Havre. These latest facilities have been installed in the west half of the big tidal basin, which until recently had not been utilised.

The present quay is about 300 metres long and will be extended to 600 metres and two berths dredged to 14 metres below the zero of the marine charts which, when completed, will be able to accommodate at the same time two of the biggest liners afloat. Part of the new works comprised the building of oil wharves alongside the south sea wall.

The illustrated article which is given on another page describes the facilities in detail.

PORT COMMISSIONER APPOINTED.

At their regular meeting on December 13th, the Board of Commissioners of the Port of New Orleans received from Governor Huey P. Long the commission of Mr. C. S. Williams as port commissioner to fill the vacancy created by the resignation of vice-president Theodore Grunewald. Mr. Grunewald has been elected by the Board to the position of port director. To succeed him in the position of vice-president the Board elected Commissioner Sidney W. Souers, and Mr. Williams was appointed by president Edw. S. Butler to serve as chairman of the Finance Committee in the place of Mr. Souers.

Mr. Williams is vice-president of Williams Inc. (lumber interests), is president of Sterling Sugars Inc., president of the City Center Realty Company, and otherwise prominent in the industrial and financial life of the community.

TENDERS FOR DREDGER AND HOPPER BARGES.

The Commercial Secretary at Madrid (Mr. A. A. Adams) reports that he understands that the Bilbao Harbour Board will shortly solicit tenders for the supply of a dredger and three hopper barges.

Firms interested in supplying British-built hopper barges, etc., can obtain further particulars upon application to the Department of Overseas Trade, 35, Old Queen Street, London, S.W.1. Reference No. AX. 7211 should be quoted.

Projected Important Developments at Hull.

AT the annual meeting of the Hull Incorporated Chamber of Commerce and Shipping, Mr. A. J. Atkinson, who presided, stated that on the value of imports, exports and re-exports Hull continued to maintain the position of the third port in the United Kingdom, being preceded only by London and Liverpool. Dealing with the trade of the port, he said that while the imports of wheat and kindred cereals during the present year were somewhat down, those of oil seeds showed some increase, and wool and petroleum were at about last year's level. Coal exports showed a fairly substantial increase, but it was evident that the Yorkshire and Midland marketing scheme in the first seven months of its operation had not produced the volume of business which exporters were led to believe would be the case, this being largely due to the limited quantities of coal released for the purposes of the foreign trade and the high prices demanded. Taken as a whole, however, it would appear from the point of view of the volume of trade of all classes, that Hull had not done so badly as some alarmists would seem to suggest. If they kept the port efficient by adopting it to the needs of changing circumstances and by the adoption of up-to-date and improved methods, there was no reason why the position of Hull as Third Port of the country should not prove unassailable. Speaking of the endeavours to make Hull the air-port of the North-east Coast, Mr. Atkinson remarked that he was afraid that a continental mail service from Hull might not pay for the first few years. It could not be expected, and for that reason it was desirable that they should have, if possible, the support of the Government, and perhaps a mail subsidy. The geographical position, combined with a national floating aerodrome in the shape of the Humber estuary and a flat surrounding country, made Hull an ideal terminus for both cross-country and North Sea services.

Mr. Good, in seconding the report, referred to the question of the land known as the Western Reservation, owned by the Corporation, and now desired by the trading community for the purposes of providing more accommodation for the timber trade and for connecting by the rail the Victoria and Alexandra Docks. The Shipping Committee, backed by the Chamber of Commerce, said definitely that this land must become, in some manner or other, the property of the railway company, either by purchase or on perpetual lease. There could be no reason in the minds of those who looked to the future of the port, why a small section of land should remain in the hands of the Hull Corporation and continue to lie idle. Hull, Mr. Good went on, was the port for a large industrial hinterland and it was absolutely essential that every convenience should be provided for the rapid discharge and forwarding of goods. If the Corporation could not see their way to yield the land up to the Railway Company then it would become the duty of the latter to apply to the Ministry of Transport, and, if necessary, to Parliament, to give the company power to compulsorily acquire the site. Mr. Good also referred to the improvement in the matter of discharge of timber, which formerly had been one of the causes of complaint against the port of Hull. The importers had adapted themselves to the new arrangements at the docks, and it now devolved upon the L. & N.E.R. Company to do their share. The Lord Mayor (Councillor B. Peersland), said that the man-in-the-street thought of Hull and its commercial interests in connection with the level crossings, and it might be that if the L. & N.E.R. Company really desired to have the Western Reservation, they might use the level crossings to do a little bargaining one against the other. Personally he thought that the railway company's offer of a contribution of £100,000 towards an estimated expenditure of a million and a quarter required for the abolition of the level crossings in the city was insufficient and a mere drop in the ocean.

Major W. H. Cooper, M.P., a director of the L. & N.E.R. Company, said that if there was anything he could do in his capacity of director in regard to the level crossings it would be done. The level crossings and the delays they occasioned were a dreadful bugbear, and he would attempt to induce his co-directors to increase their offer. With regard to the Western Reservation, the L. & N.E.R. Company were quite willing to take over the land provided they had security of tenure and they were allowed to develop it in the best interests of Hull. They desired to keep on good terms with the Corporation and they hoped that some further approach would be made and that they would be able to arrive at terms such as would be of benefit to the port.

Since the Chamber of Commerce meeting, Sir Alfred Gelder, a pioneer in the opening out of new streets in the centre of the city 25 to 30 years ago, has come forward with a proposal that the Corporation should hand over the Western Reservation to the London and North Eastern Railway Company in exchange for the Old Queen's Dock, now but little used and more or less of a " white elephant " to the railway company. This dock has a water area of just over ten acres and was opened in 1779. It was built on part of the site of the moat and walls that surrounded the town, and was the first of its kind in the Kingdom. It is thus just upon 150 years old and is one of a chain of similar docks, smaller in size, which occupy the site of the old walls, by which Hull was fortified, and cut off the old town entirely by water. Once a commercial advantage The Queen's Dock is hardly so any longer, and is used by small coasting steamers and fishing trawlers being fitted out or undergoing repair. Structurally it is not in the best condition and its maintenance must be a costly matter for its owners. Sir Alfred Gelder's idea is that if the exchange were made the dock should be filled in and made into a boulevard and public gardens and be a means of facilitating communication between the old town and the Greater Hull, which has sprung up beyond it in the past hundred years. One objection is that it would deprive the river craft of one means of access from the old dock to the river Hull, but the reply to this is that they would still be able to use the river Humber as an alternative route as they would do in the case of lighter traffic passing from the new docks to the mills on the banks of the Hull. There is also the question of the warehouses and timber yards abutting on the dock, but they would be replaced by building sites of no little value. The suggestion, however, has not yet assumed tangible form but ought, possibly, form the basis of negotiations when the representatives of the Corporation and the Railway Company again meet.

If the old docks at Hull, or at least one of them, has outlived its usefulness, not less a barrier to progress are the level crossings in the city, which are a serious hindrance not only to the street traffic but to the rail-borne goods from the docks. Since our last report an intimation has been received from the Ministry of Transport offering a contribution of half a million sterling towards the cost of the carrying of the railway lines around the city on the high level. The scheme already prepared puts the total cost at something under a million and a quarter to which the London & North Eastern Railway Company, as just stated, offer to contribute £100,000, which, it is generally agreed is inadequate in view of the obvious advantage that would accrue to the working of the railways of the port. There is also some disappointment that the Government's offer is not larger, having regard to the more liberal assistance given to Liverpool in respect of the new Mersey Tunnel, and to Newcastle in respect of its new bridge over the Tyne. As things now stand the Hull Corporation would be called upon to provide approximately 50 per cent. of the money required to carry the scheme through. Nevertheless, the Government's offer cannot be ignored, though there is, of course, some hope that in the circumstances the Minister of Transport may be induced to afford a larger sum. In any event, it is expected that the London & North Eastern Railway Company will promote a late Bill in the present session of Parliament, and that not much difficulty will be encountered in obtaining the suspension of Parliamentary Standing Orders to enable this to be done in January. This decision is necessary if Hull is to obtain a grant from the Unemployed Grants Committee to provide work for the unemployed, which could be done by taking in hand some preliminary operations.

The position with regard to the Hull Corporation's scheme for the construction of an extended landing stage and floating pontoon at Victoria Pier, for the better accommodation of the ferry traffic across the Humber, between New Holland and Hull, is unchanged. It seems probable, however, that the river craft interests will raise objections. In the meantime Mr. F. W. Bricknell, a former Hull City Engineer, has submitted to the newly-appointed Development Committee a plan for the establishment of a vehicular ferry across the Humber from a point at Hessle, on the Western boundary of the city, to Barton on Humber in North Lincolnshire. Mr. Bricknell is confident that the amount of traffic would be sufficient to make the proposal financially successful on the basis of the existing road traffic on either side of the river, and tolls at the same level as those charged at the Gainsborough Bridge over the Trent.

A very important venture in the manufacture of chemicals is foreshadowed by the erection of modern works at Saltend, on land recently acquired from the London & North Eastern Railway Company by Distillers, Ltd., which concern recently took over the firm of Messrs. Green & Co., whose operations so far have been confined to making power alcohol and kindred products from molasses. The manufacture of chemicals, hitherto imported in large quantities from Germany, for the artificial silk industry, is now to be undertaken, and plant brought from Germany is being installed for the purpose. The works will be of dimensions stated to be the largest of their kind in the world, and the products of aceton, etc., will be in direct competition with German imports. Arrangements have been made with the Humber Conservancy Board for the taking of water from the river and the return of it after use.

Irish Harbour Matters.

DUBLIN PORT AND DOCKS (BRIDGES) BILL.
-Preamble Proved.

The Joint Committee of the Irish Free State Dail and Senate which has been considering the Dublin Port and Docks (Bridges) Bill, announced towards the end of November that the preamble, which had been opposed by the County Council on the ground of the incidence of taxation, had been proved.

The Bill provides for the widening of Butt Bridge so as to make it capable of carrying four lines of traffic, and the building of a transporter bridge with two gondolas further down the Liffey.

Mr. Alfred Delap, President of the Institute of Civil Engineers, said that the rebuilding of Butt Bridge was a crying necessity. He knew of no transporter bridge suitable for the type of traffic they had in Dublin. The proposed Dublin transporter bridge was really two transporters in one. His main objection to it was that it could only produce intermittent traffic. He would put the life of a steel structure at 30 to 40 years.

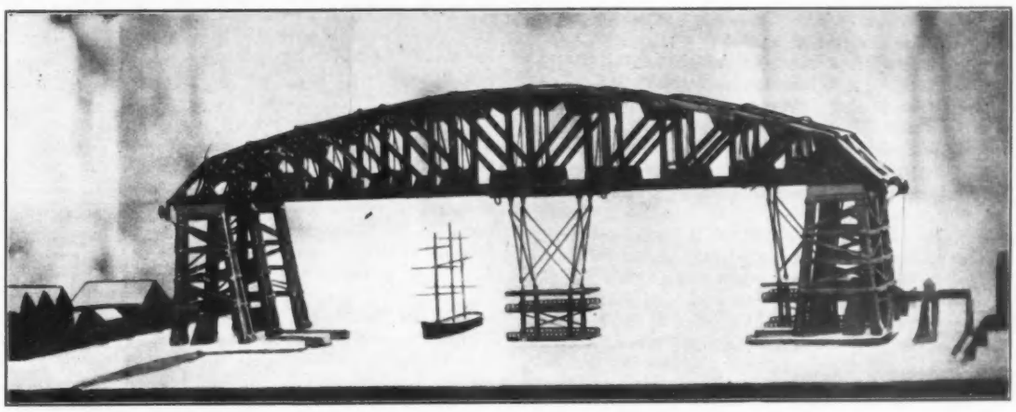
Mr. Wood, K.C., on behalf of the Dublin Corporation, stated that an agreement had been reached on the principle that what would be the City of Dublin would be the first item of the area of charge. The second item would be the urban districts of Rathmines and Rathgor, Pembroke, Blackrock, Dun Laoghaire, Dalkey, Killarney and Howth. The third item would be a number of townlands immediately adjoining the areas mentioned, and in which agricultural interests would be excluded from the rate.

Mr. Walker, K.C., for the Port and Docks Board, stated that the Board were now prepared to increase their offer and bear 50 per cent. of the working expenses of the transporter bridge.

The Chairman (Professor Thrift) said that in the offers made by Counsel they appeared to have the essential features of agreement. He now felt free to tell the Committee that there would be no difficulty in getting from the Road Fund through the Minister for Local Government and Public Health a grant of one-third of the working expenses of the transporter bridge.

AN ENGLISH TRANSPORTER BRIDGE.

One of the witnesses heard before the Committee was Mr. Burgess, Borough Engineer, Middlesbrough, who said that



Model of the Transporter Bridge which the Dublin Port and Docks Board propose to erect over the River Liffey, opposite Guild Street. It has two "gondolas," each capable of carrying 16 vehicles and 700 passengers. One of these gondolas is shown crossing towards the tower on the right. The other gondola is in its "dock," taking a fresh load. The sailing ship, with masts higher than those of a steamship, is introduced to show the clearance of the upper structure.

Mr. Walker, K.C., who, with Mr. Overend, K.C., appeared for the promoters, stated that the transporter bridge was not initiated by the Port and Docks Board but by the Government. He admitted that the Board had an accumulated surplus of £200,000, but that was required for the development of the port and for renewals. He suggested that the area of charge should be distributed over the property of the Board, the Dublin Corporation and the County Council.

Mr. E. H. Bailey, Secretary, Dublin Port and Docks Board, said that the surplus of £196,000 referred to had accumulated over 15 years. It was pledged for several contingencies including payment of interest on debentures, stocks and mortgages. The annual liability of the Board for interest under these heads was £45,000, and the total annual liability, including income tax, was £65,000. He did not believe that either the transporter bridge or reconstruction of Butt Bridge would bring new revenue to the funds of the Board.

Mr. J. Wallagh, Chief Engineer of the Port and Docks Board, said a deeper berthage than could be obtained at the South Wall was required by some vessels trading at the port to-day. To meet that programme, Alexandra Basin had been built. At present the Board were committed to large schemes of improvement, one of which would cost £20,000, and the other £12,000. They would deepen the bar and that work was proceeding. The intention was to give a depth of 33-ft. at standard low water. Four new hoppers would be required during the next five or ten years, and these would cost £40,000 each. The space on both sides of the river which the transporter bridge would occupy was worth £9,000.

Mr. C. F. McGloughlen, Vice-Chairman of the Port and Docks Board, said that the original intention was to widen Butt Bridge. In response to the wishes of President Cosgrave and others the transporter bridge had been included in the Bill. It was not a revenue-producing scheme for the Board, but would undoubtedly facilitate traffic. The Board would not have brought forward the scheme if they thought they would have to pay for it. Dublin was a competitive port and for that reason they had to strain every nerve to reduce dues.

AREA OF CHARGE DECIDED.

Having heard criticisms on behalf of the Dublin Corporation and the Dublin Council,

The Committee announced their decision as to the cost of construction of the new bridges. They thought that it ought to be borne by a loan, to be paid for out of a bridge tax or a bridge rate.

the transporter bridge across the Tees originally cost £70,000. It had been 18 years in operation, gave a ten minute service and had proved satisfactory. It was cheaper than a permanent bridge and caused less inconvenience to traffic than an uplifting bridge. Having regard to every consideration, the site for the proposed transporter bridge was admirable. In reply to Mr. Wood, K.C., for the Dublin Corporation, he said that the Middlesbrough bridge was capable of transporting 360 vehicles per hour. The Dublin bridge, which would have twin moving platforms, was estimated to carry 720 vehicles per hour.

A TOLL BRIDGE.

To Mr. J. Georghegan, K.C., for the Dublin County Council, Mr. Burgess stated that the Middlesbrough bridge was a toll bridge and had made a net profit every year since it was opened, which now amounted to £5,000 per year. The toll charges were 1d. per person; six workmen's return tickets cost 8d.; pedal cycles and riders 1d. each; motor cycles 2d. and 1d. for the driver; motor cycles and side car 4d. and 1d. for the passenger; ordinary motor cars 6d. each; extra passengers 1d.; motor lorries 6d. and 6d. per ton weight and contents; half tons 3d.; horse car and driver 6d. and 6d. per ton contents. The nearest permanent bridge was four miles away.

To the Chairman (Professor Thrift) witness said they had no trouble with the bridge in stormy weather, and only occasional brief stoppages for repairs. In Dublin, with twin platforms and a double service, there need be no total hold-up unless the power supply failed.

MR. MALLAGH'S DESIGN.

Mr. Mallagh, Engineer of the Dublin Port and Docks Board, recalled, produced a model of the proposed reconstruction of Butt Bridge, and also of the proposed transporter bridge, showing the two double-deck moving platforms. One deck could take any vehicle or railway wagon used in Ireland, and the other was capable of carrying 67 pedestrians. With perfect loading arrangements and with a five minutes service it would carry approximately between 700 and 800 cars per hour. The witness showed a model to scale of one of the British and Irish steamers going under the proposed bridge, and pointed out the head room that such a ship would have when passing under the bridge. An abutment into the river was necessary to some extent, but so far as the flow of the river was concerned these abutments would not seriously interfere with it. The trans-

porter bridge, as planned, he said, was the most suitable for Dublin. Above the bridge they were confined to 20-ft. of water at low tide, which limited the number of ships that could berth above the bridge. Below the bridge they could accommodate ships that needed 35-ft. of water at low tide.

The transporter bridge would relieve congestion at the North Wall, the total volume of traffic there, according to their census, being 3,000 vehicles per ten-hour day.

WHAT IT WILL COST.

His estimate for the cost of the two new bridges were outside figures. For Butt Bridge he allowed £90,000 including £4,000 for the erection of a temporary bridge while the new one was being built. The removal of the existing bridge and the disposal of the materials was estimated to cost £11,400, and the cost of erecting the new bridge was estimated at £74,600. He estimated £167,000 as the total cost of the transporter bridge; £160,000 for the bridge itself; £2,700 for the purchase of the necessary land; and the remainder for the necessary quay alterations. He had allowed £25,000 for the foundations, which would not be so costly as they had been at Middlesbrough.

SMALL MAINTENANCE OUTLAY.

For the first ten years he thought that the only maintenance on the transporter bridge would be painting. He had no hesitation in saying that the life of the bridge would be more than 60 years. The estimated operating expenses of the transporter bridge were £3,800 per annum. Working in two shifts—from 5 a.m. to 7 a.m. they would work one gondola. From 7 a.m. until 9 p.m. the two gondolas would work, and the second gondola would then work from 9 p.m. to 11 p.m. The bridge would thus be working 18 hours per day, though each gondola would only work 16 hours.

The estimated annual wages bill of the transporter bridge would be about £2,028. This included a superintendent at £286 per year; drivers, £728; four conductors, £624; police, £130; greaser and labourer £260. The position of the transporter bridge would not interfere with Dublin if it became an airport.

The Bill passed its committee stage on the 5th December.

CORK HARBOUR AS A FREE PORT

On the motion of Mr. Haughton, seconded by Mr. Lineham the Irish Free State Senate has passed a resolution asking the Government to inquire into the desirability of creating in Cork Harbour a free port or free zone, and of utilising for the purpose the site of the Island of Haulbowline and adjacent property. Haulbowline costs the Government over £20,000 in upkeep, and is an ideal site for the purpose, being completely shut off from the mainland.

MR. W. A. HEWAT.

Mr. W. A. Hewat has been nominated by the Dublin Port & Docks Board as the representative of Irish Free State interests on the Executive Committee of the Dock & Harbour Authorities' Association.

LIMERICK HARBOUR BOARD.

Following the election of five members as harbour ratepayers' representatives, the Limerick Harbour Board is now composed as follows:—Senator Goodbody, Messrs. G. E. Goodbody, J. H. Roche, G. R. Ryan, S. J. K. Roycroft, E. Holliday, M. J. Russell, P. N. Treacey, T. J. Loughrey, E. R. Shaw, with six representatives of the Corporation, and Mr. F. J. Cleeve, President of the Limerick Chamber of Commerce.

Recent Legal Decisions.

Rating and taxation and the reliefs therefrom have become so important a subject not only in legal interest, but in the much more practical way of financial administration, that we need no excuse for referring to two cases lately decided regarding these matters. One of these (*Commissioners of Inland Revenue v. Forth Conservancy Board*) in which the House of Lords has just issued judgment, was an appeal against an interlocutor pronounced by the First Division of the Court of Session, as the Court of Exchequer is Scotland, in a case stated for the Commissioners on appeal by them under the Income Tax Act, 1918, from a determination of the Commissioners for the general purposes of the Income Tax for the district of Stirling relative to assessments to Income Tax for the five years ended April 5th, 1926, made upon the respondents under Schedule A, No. 111, Rule 3, of that Act. The assessments were for the year 1921-2, £2,841; 1922-3, £4,083; 1923-4, £4,083; 1924-5, £7,624; and 1925-6, £5,294.

As the Board has no profits from or arising out of any lands, tenements, hereditaments, or heritages, the sole revenues being derived from shipping dues, they protested against the assessments, and the special Income Tax Commissioners found them not assessable, a decision affirmed by the First Division of the Court of Session, so the revenue authorities appealed to the House of Lords, where it was submitted on their behalf that the Board was liable to assessment because their profits arose from tolls within the meaning of Rule 3, No. 111, Schedule A, of the Income Tax Act, 1918, and the judgment of the Court of Session was unfounded in law and should be reversed.

Their Lordships were unanimous in affirming the decision of the First Division of the Court of Session and dismissing the Crown's appeal. Lord Buckmaster (who presided) after stating the facts and referring to cases cited during the hearing, said in conclusion—The Scots cases, like the English, are not authorities upon the actual point. But the case of Adamson v. Clyde Navigation Trustees is a clear decision that dues paid for navigation of the River Clyde to the Navigation Trustees could not be subject to assessment to the poor rate as lands or heritages. This case was carried to this House by the Clyde Trustees, who appealed unsuccessfully against their assessment in respect of their occupation of docks and wharves, leaving the other question untouched. The case of Commissioners of Leith v. Miles really decided only the validity of an assessment in respect of lands, quays, harbours, docks, etc., and the real question once more was whether the purposes to which the receipts were applied exempted them from liability. The Court of Session were right when in the case of the Assessor for Lanarkshire v. Clyde Trustees they held that the principle laid down in Adamson's case had not been over-ruled in the House of Lords, " There is therefore nothing in any of the authorities on which reliance can be placed by the appellants, and in my opinion the true construction of the statute is fatal to their appeal."

The other case was a note of suspension and interdict at the instance of the Clyde Navigation Trustees against the Corporation of Glasgow and against the City Collector of Glasgow, in which the complainers sought to have the respondents interdicted from taking measures to enforce payment of (1) the sum of £502 5s. 4d., the unpaid balance of the amount of local rates for 1927-28 in respect of lands and heritages owned and occupied by the complainers in the Parish of Glasgow; and (2) the sum of £773 13s. 4d., the unpaid balance of the amount of local rates for the same year in respect of the complainers' lands and heritages in the Parish of Govan. The complainers said that under Section 48 of the Glasgow Police Act, 1866, they had not been in wont to enjoy a relief from taxation on any such ground as poverty and non-occupation, but they had a right, as against a mere abatement, to a deduction in respect that they undertook part of the duties of lighting and cleansing their quays, wharves, sheds and streets, which would otherwise fall upon the Corporation, and in respect of which the Corporation rated the community generally to the police-general purposes rates. The complainers claimed a deduction of a sum equal to 8d. per £1 on the gross annual value of their undertaking, and they denied that the deduction was calculated only upon the yearly rent or value upon which the police-general purposes rates were payable.

The Lord Ordinary in giving judgment for the complainers said that up till the year 1927-28 it appeared that no difficulty was found in applying the right to a deduction, because the entity described as " the gross annual valuation—as appearing in the Valuation Roll," to which the deduction had to be applied, was never in dispute. It was de facto the annual entry against these subjects in the Valuation Roll. The question had arisen because, under the Rating (Scotland) Act, 1926, the Clyde Navigation Trust properties, along with a great number of other specified properties, had been made the subject of what was described as a relief or abatement or deduction. The contention of the Corporation was that since the passing of that Act the proportionate deduction to which the Clyde Trust was entitled under Section 48 of the 1866 Act ought to be applied to the factor on which their quotient of rate was de facto worked out—that was, to what was called in the new statute rateable value and not what was called gross annual value. That was to say, the difference of 8d. was taken off the rates applicable to the rateable value, and accordingly it appeared by a simple process of arithmetic that the deduction of 8d. was made upon the rateable value and not upon what was formerly called the annual value in the Valuation Roll, nor upon what was now known as the gross valuation.

That this was so was frankly agreed by Counsel for the Corporation, who pleaded that at least it was a rational interpretation and it was said, an equitable interpretation that the factor on which rateability proceeded should also be the same factor on which the deduction was calculable. The complainers made quite a different matter of it, and on the merits his Lordship proposed to sustain their view. It appeared to his Lordship, apart from the mere construction of the words, that there was overwhelming force in the view put forward by them that the deduction, being a matter in respect of the cost of service, should not, either in equity or as a matter of fair construction, diminish by any whit owing to the fact that, in common with many others in the city, a certain relief from the full burden of rating was given by Section 12. The cost to Trustees, Counsel said, was not now less but greater, and the deduction in question was quid pro quo for that service. His Lordship thought that was the preferable way of looking at the matter, and that accordingly there was no argument by parallelity or analogue to be begged in aid.

Book Review.

MOTOR SHIPPING.

A Study of the Diesel-Engined Ship in Relation to Present-day Shipping, Showing Something of the Newest Era in Sea Transport. By A. C. Hardy, B.Sc., F.R.G.S., A.M.Inst.N.A., etc. (Chapman & Hall, Ltd.—15s.)

This work is the second of a series, the first being Motor Ships, which discussed the problem connected with the marine internal combustion engine and the motor ship from a technical point of view; while the present volume deals with the changes which have taken place in water transportation and how the Diesel engine has affected ship design and lay-out, and altered in course of time the carriage of freight.

Mr. Hardy has had every facility for investigating the problems connected with the progress and development of motor shipping, and the resulting volume is very welcome as placing before those interested in modern shipping a work containing a quantity of instructive information from a reliable source.

There are some, of course, who may consider as somewhat sweeping the author's statement that there is a new era—Motor Shipping—in water transport, but while the motor ship may not wholly displace the steamer on certain routes and for certain purposes, one cannot but admit that motor shipping is effecting vast changes in water transport, just as motor transport is bringing about great advances in road transport on land. So far-reaching are the changes involved that no man desiring to be abreast of the times can afford to be in ignorance of them.

One may safely say that the present development of the motor lorry and the motor ship is the outcome of the mechanical lessons learned in the Great War, for as so much merchandise is now carried by different routes ashore—the road—so similarly are many trade routes on the high seas changing attributable entirely to the motor ship.

Forewords have been written to the volume by Lord Kylsant, Chairman of R.M.S.P. Co., White Star Line, etc., and Sir Frederick Lewis, Chairman of Furness Withy & Co., Ltd.

The author opens his work with a chapter on Motor Shipping Development, and in asserting that the momentum of the motor shipping movement is now sufficient to carry it on, urges that no one in the shipping world should fail to investigate the possibilities of the Diesel engine, but confesses that in many cases the ship owner, although having investigated, does not always adopt the Diesel-engined ship. For this the writer ascribes two reasons—prejudice on the part of those "nurtured on steam," and "ignorance of the Diesel" on the part of most others. In spite of this, however, it is a fact that there is more motor shipping being built than steam shipping at the present time. The enthusiasm of large shipowners like Lord Kylsant and Sir Frederick Lewis has resulted in the transformation of complete fleets of ships to Diesel power.

Chapter II. deals with Motor Shipping and World Trade Routes, and here the author points out how in the old days of windjammers the "express" trade routes were limited to those regions of the ocean in which good prevailing winds aided the fine-lined ship. He proceeds to show how with the coming of the steamers new routes were created and coaling ports formed wherever there was demand for "express" cargo, and how the influence of coal is paramount no longer but its place taken by oil.

This latter factor alone—which, incidentally, is responsible for a great deal of the industrial unrest in Great Britain—has influenced maritime geography to a considerable degree, both commercially and strategically—commercially because the positions of oil bunkering stations are not necessarily those of coaling stations, and in order to secure cheap bunkering facilities, a shipowner may find it advisable to re-route his motor ship.

Mr. Hardy shows also how competitive effort is not only changing the geography of trade routes but is building up new routes and also producing better ships of all kinds, for the motor ship is not only competing with the steamship but with motor ship also.

Motor Ship Performance and Motor Ships as Fuel Conservers are subjects dealt with at length in Chapters III. and IV. It is pointed out that the success of the motor ship depends entirely upon its performance; that is to say, upon its speed and its economy of operation.

A large number of ships are quoted with full details as to their sailings, cargoes, types and the records which they created. Some instructive tables are given—Sea Passages of Representative First-Class Motor Ships, Typical Motor Ship Fuel Consumption, Comparative Fuel Consumption Figures for Steam Oil Burning, Diesel-Steam Auxiliaries, and Diesel-Electric Auxiliaries. Ship operators should find these figures of interest in making comparisons between various types of ships.

The many ways in which the motor ship figures as a fuel conserver are discussed and compared with steamers using oil and pulverised coal as fuel, and reciprocating engines and turbines as the prime movers. Mr. Hardy acknowledges that the steamers with their latest improvements in fueling, boilers and engines, are not allowing the economies of motor shipping to go unchallenged.

Chapter V. is entitled, "Motor Freighters are Distinctive Units," and Mr. Hardy desires us to note that the motor ship as we know it to-day is tending to depart more and more from stereotyped steamship practice as regards general arrangement. He welcomes this tendency as showing that the majority of people are coming to realise that a ship and its Diesel propelling machinery are each an integral part of a homogeneous whole; that it is fundamentally incorrect to take some given hull (A) and some given Diesel engine (B), which happens to fall within *n* per cent. of the powering requirements, to fit one within the other, and call the result a motor ship.

The general layout of the power unit, engine room arrangement and auxiliaries, deck and hull machinery, are freely discussed, and some new views and ideas and unconventional arrangements are placed before the reader.

The Problems of the Motor Passenger Liner is the subject of the succeeding chapter, and the opening statement is undoubtedly true, that when the White Star Line placed an order with Harland & Wolff shipyards at Belfast for a large motor passenger liner of the "Adriatic" type, an epoch in motor shipping history was marked. It is pointed out that there are a number of factors entering into the study of high-class passenger motor liners which do not need to be considered where freight ships and intermediate-passenger-cargo ships are concerned. These considerations are brought to notice and discussed.

Not the least of the problems confronting the Diesel engine building industry at the present day is the provision of oil engine power for the very big ship with high speed in a very small space, and providing the small fast ship with a high power within what is comparatively speaking an infinitesimal space. The advantages gained by the use of Diesel power, space gained, no hot boiler casings, better arrangements and layouts possible, cleanliness, no inconvenience and dirt resulting from oil bunkering, are a few of the distinctive features of motor passenger liners discussed in detail by Mr. Hardy in a practical and clear manner.

The Chapter following—No. VII.—discusses Small Fast Passenger Motor Ships and their special problems. Many examples of the world's ships engaged in this class of work are given with tables of dimensions and machinery particulars.

Chapters VIII., IX., X., XI. are devoted to World Trade Routes and Motor Ships, Diesel Electric—scope and limitations, Problems of the "Converted" Motor Ship, Standardisation of Power Respectively; while the concluding Chapter of this interesting work deals with Diesel Engines and Naval Craft.

Space does not permit of a detailed description of these sections of Mr. Hardy's book; it is sufficient to say that they handle the subjects in an entirely practical and instructive style, being full of information of an interesting and absorbing character.

The volume is replete with good illustrations—photos, drawings, diagrams and tables, and Mr. Hardy is to be congratulated upon having carried out his work with thoroughness, producing a book which must prove of value to all whose business lies with ships and shipping and who desire to obtain all-round knowledge regarding present-day developments in motor shipping.

MARCONI DIRECTION FINDERS FOR ELDER DEMPSTER LINERS.

Messrs. Elder Dempster & Co., Ltd., have given orders for their ships "Adda," "Accra," "Apapa," "Appam" and "Albinsi" to be fitted with Marconi Direction Finding apparatus, and the work of installation will proceed as the ships become available.

The Marconi International Marine Communication Company's Direction Finder Type 11G is the latest design of marine direction finder, and uses high frequency amplifying valves of the screened grid type. These are enclosed inside the instrument case which is of metal construction and which is divided into separate compartments effectively shielding the circuits from each other and from external interference. By this means the possibility of errors being introduced by local electrical apparatus is reduced to a minimum.

Another feature of this instrument is the introduction of two calibrated dials in the direction fined unit. One is fixed, and the bearings indicated thereon are relative to the ship's head. The second dial is rotatable and on being set to the ship's true course will indicate true bearings that need no correction, providing the ship is on her course when the bearing is taken.

Notes from the North.

RIBBLE DOCK TRAFFIC.

Due to the falling off in traffic at the Ribble Docks, it was suggested at the last meeting of the Preston Town Council that there might have to be a drastic curtailment of expenditure. Alderman Hodgson said the Ribble Committee would shortly have before them details of the expenditure and there would possibly be a reduction in the matter of working expenses. They were not alone in the falling off of traffic. All the docks in the country were very much in the same position. A great many timber merchants overbought themselves last year and timber had to be got away before further large quantities were brought in. Steps are being taken in the meantime, drastically to reduce expenditure on the docks and the proposals in this direction will be brought forward. Another member of the Council took exception to the appointment of Councillor Ellison as Vice-Chairman of the Ribble Committee. Councillor Ellison, he said, was associated with a railway company which was in competition with the dock undertaking, and if any circumstances should arise involving a dispute, it was essential that both the Chairman and Vice-Chairman of the Ribble Committee should be men who could act with absolutely strict impartiality in regard to the decision arrived at. Having regard to precedents observed by the Council in the past, the observance of which had been emphasised and quite rightly emphasised, by members of the Council, he moved that the appointment of the Vice-Chairman of the Ribble Committee be referred back.—The motion was defeated.

GRAIN ELEVATOR FOR PRESTON DOCKS.

At Preston Dock, a pneumatic grain elevator plant has been installed for Messrs. Joseph Pyke & Son, corn merchants, of Preston. This plant sucks the grain out of the ship's hold and throws it into bins which move on to automatic weighers. It is estimated that between 60 and 70 tons of grain can be discharged every hour by this new method, which scraps the old and laborious system of handling the grain with men shovelling it into bushels and then hoisting it into the warehouse. By that arrangement it was necessary for half a dozen men to be in the hold to bag the grain after it had been scooped into the bushel, but now the pump is simply lowered into the hold and can be managed by one man. The structure stands about 60-ft. high, and the grain is drawn up by a large boom, to be weighed in half tons, at the rate of one ton a minute before going down into the two bins. From these the grain is either shot down into bulk wagons or carried to the machines, which weigh the grain for men to tie up into bags. The pump is of the vertical type.

OLD LINER LANDMARK TO GO.

Negotiations have been in progress for several months between the Mersey Docks and Harbour Board and the War Office having for their object the removal of the Seaforth Fort, or Battery. There is reason to believe that the negotiations have been satisfactorily completed and that an agreement, on specific terms, has been arranged whereby the battery shall be evacuated by the War Office at no distant date. Seaforth Battery was originally provided to take the place of an old battery situated at the Huskisson Dock, which was erected in 1854 to supersede another old structure of a similar character which stood at " Hog's Hey Nook " on the site of the present Collingwood Dock.

MOTOR USERS WANT DOCK CHUTES.

To facilitate the loading of vehicles at the docks, Liverpool Area Committee of the Commercial Motor Users Association has had under consideration the desirability of chutes being installed at the dock warehouses. Representations have been made to the Mersey Docks and Harbour Board, and although a few chutes have been fitted at one or two dock sheds, no satisfactory reply has yet been received. The C.M.U.A. feels that it has a strong case for urging the extension of this method of loading.

A BIG LIFT.

Weighing 180 tons, one of the main river gates of the Brunswick Dock, Liverpool, which had been damaged by the carrying away of the working chain, was lifted and removed for repairs recently. The task, which was an intricate one and involved some 30 men besides the crew of the tug Hornby, was carried out by the Dock Board's huge floating crane, the Mammoth. The crane's maximum working power is 200 tons and since the weight of the dock gates was 180 tons, there was a safe margin of only 20 tons. The exact damage to the gate was not known, so it became necessary to reinforce the whole of the big structure, 40-ft. high, with iron stays and rivets, lest it should fall to pieces under the increased strain when lifted into the air. A crew of 20 men were working for some three hours before the slips could be properly fastened. The time set for the actual raising of the gate was high tide, and almost to the minute the Mammoth started to draw its 180 tons burden clear of the dock. As it rose slowly into the air it was seen that the gate, festooned with seaweed and barnacles, was badly warped, and had received some damage by the breaking of the chain near the top.

" A GREAT INSTITUTION."

Speaking at the annual banquet of the Liverpool Shipbrokers' Benevolent Society, Lord Derby, who proposed the toast of " The Mersey Docks and Harbour Board," said the Board was one of the greatest institutions in the city. He would never forget seeing the new and big ships coming into the new Gladstone Dock. It made one realise the foresight and vision of the Board. He looked upon statistics as a barograph which showed the " ups and downs " of the immediate position of trade, and he looked upon the Dock Board as a barometer, for it was well qualified to judge the future with its foresight.

Mr. R. D. Holt (Chairman of Mersey Docks and Harbour Board) said the Board has a good many troubles in front of them, the question of sea channels being an extraordinarily difficult one. In that respect they were always in an atmosphere of trial and error, but he had no doubt they would pull through.

The chief guest of the function was Mr. Rudyard Kipling, who previously enjoyed a trip on the Overhead Railway, which enabled him to view the liners in the docks at the North end of the riverside estate. The excursion had been arranged by the Cunard Company and by the Overhead Railway.

DOCK BOARD RETURNS.

We have received from the Mersey Docks and Harbour Board a copy of their annual accounts for the year ending July 1st. The accounts were presented to, and accepted by, the Dock Board at their meeting on November 29th. The number of vessels which paid rates to the Board numbered 20,078, compared with 18,592 the previous year, representing 20,158,500 tons compared with 20,739,163 the year before. The total rates and dues received on vessels and goods amounted to £2,764,664 as against £2,917,689 in the year 1926/7. The total rates and dues on goods amounted to £1,211,855. According to the statement made by Mr. Richard D. Holt, the surplus on the warehouse accounts shows an improvement of £14,589. Raw cotton showed a falling off of £42,000 on imports and £3,000 on exports, the total imported falling from 688,834 to 433,371 tons. Exports of woollen manufactures had risen from 64,026 packages to 102,577 packages. The total tonnage of vessels entering the docks at Liverpool and Birkenhead during the year was 15,246,121 and this is the greatest tonnage ever dealt with except last year, when the conditions were abnormal consequent upon the coal stoppage. In the annual summary showing the disposal of foreign import cargoes at Liverpool and Birkenhead during the year ending September 30th, it is recorded that the gross tonnage was 6,619,479, of which nearly 5,000,000 tons was consigned to local warehouses, factories and mills. Motor lorries conveyed from the dock estate to outside districts 373,000 tons.

NEW FLEETWOOD SEA WALL.

A new sea wall is being constructed on the Fleetwood coastline to safeguard the district against tidal inundation. It was stated at the Town Council meeting that Mr. Lewis, the Council's Consulting Engineer, had examined the foreshore and he was extremely gratified and delighted at the way in which the beach was being improved. In front of the wall, where the " apron " had been provided for its protection, a bank of shingle had collected and this was making a good beach up to the foot of the wall. The groynes which had been completed were acting as well as could be expected, and the foreshore was building up very satisfactorily. The only cause for anxiety at present was between groynes 16 and 18, and measures had been taken to cover the clay in that section with concrete, which would protect and prevent any further erosion. As far as the wall had been completed the whole of the beach was now in a very satisfactory condition and inspired confidence.

HONOUR FOR DOCK CONTRACTOR.

Mr. John Newell, of Messrs. Monk & Newell, Ltd., Regent Road, Bootle, railways, docks and public works contractors, is one of the oldest magistrates of the County Borough of Bootle. He has just completed 50 years service as a Justice of the Peace and to commemorate this record, his magistraterial colleagues have presented him with a silver salver and illuminated address. Mr. Newell was Mayor of Bootle in 1878, and he is now in his 85th year. He is still an active magistrate and for over 20 years had been Chairman of the Licensing Justices. Mr. Newell is an honoured member of the Liverpool transport trade and he is a regular attender at the meetings of the Liverpool Cart and Motor Owners' Association, in which he takes an active interest.

WEAVER NAVIGATION.

The revenue of the Weaver Navigation Trustees for the year ending November 15th, has continued good, and after payment of debt charges and allowance for wear and tear, shows a

credit balance of £11,800 on the year's working. The bulk of this has, however, been expended on maintenance of canal and works, and in paying off the final instalment in the Ship Canal actions. The total tonnage and tolls with the total revenue on the Navigation for the past three years ended 31st December, 1927, and for 1928 (approx.) are as follows:—January to December, 1925, 745,180 tons, £56,493 tolls, £70,088 total revenue; January to December, 1926, 743,908 tons, £53,914 tolls, £60,800 total revenue (coal strike); January to December, 1927, 799,188 tons, £60,433 tolls, £76,492 total revenue; January to December, 1928, 772,203 tons, £59,030 tolls, £73,027 total revenue (approx.).

£700,000 MERSEY TUNNEL CONTRACT.

Sir Robert M'Alpine & Sons, of Pall Mall, London, S.W., have secured contract No. 3 of the new Mersey Tunnel scheme. This contract amounts to between £700,000 and £800,000, and covers the construction of the full-sized tunnels on the Birkenhead side of the river from the Morpeth branch dock shaft to the portals at Albion Street and Rendel Street respectively. Sir Robert M'Alpine & Sons carried through the construction of the new harbour at Takoradi, in West Africa.

HISTORIC DOCK BOARD ENGINE.

One of the Mersey Docks and Harbour Board's historic engines, the "Lion," which has now finished its active career, after 70 years' work, has been presented to the Liverpool Engineering Society. The "Lion" was one of the first, if not the first, locomotives built by Messrs. Todd, Kitson and Laird for the Liverpool and Manchester Railway in 1838. After more than 20 years' service the "Lion" was sold by the L. & N.W. Railway Company to the Mersey Dock Board, by whom it was used on the chain pumps at the Prince's Graving Dock. In view of the approaching centenary of the opening of the Liverpool and Manchester Railway, on September 15th, 1830, an effort is being made to raise funds for the reconditioning and proper housing of the "Lion," so that, historically and technically, it can be restored to its original form.

POWER STATION ON CLARENCE DOCK SITE.

Liverpool City Council, on December 5th, decided to constitute a Special Committee, consisting of 15 members, for the purpose of dealing with all matters arising out of, and in connection with the scheme for the construction of the new super-electric power station on the site of the Clarence Dock, which has been purchased from the Mersey Docks and Harbour Board for the purpose. The Special Committee consists of the following members, namely:—Alderman The Right Honourable Sir Archibald T. Salvidge, P.C., K.B.E., Councillor William Albert Robinson, Councillor Lawrence Durning Holt, Alderman John Clancy, Alderman Sir Max Muspratt, Bart., Alderman Frank Campbell Wilson, Councillor Sir Thomas White, Alderman Robert Lowry Burns, Alderman Patrick Jeremiah Kelly, Councillor Alexander Critchley, Councillor John Morris Griffith, Councillor Alan Layfield, Councillor Henry Walker, Councillor Ernest Whiteley, Councillor Thomas Alfred Patrick (Bootle).

PENSIONED OFF.

One of the Mersey Dock and Harbour Board's 100-ton cranes, the one which has done nearly 45 years' work on the site of the Langton Dock, Liverpool, and for years enjoyed the distinction of being the largest and finest in the world, is to be scrapped. With a base of granite, cemented with concrete, it had an imposing appearance. From the foundation, 20-ft. high by 100-ft. in circumference, rose a gigantic derrick. Experience, however, proved that when it was necessary to transport a heavy weight from a railway wagon to a vessel in dock, it was necessary to await the pleasure of the tide. The largest crane now in use on the dock estate is the 200-ton floating Mammoth.

CHEAPENING TRANSPORT AT THE DOCKS.

"The Science of Industrial Traffic Management" was the subject of an address at Liverpool, on December 6th, by Mr. G. B. Lissenden, Traffic Manager, Lever Bros., Ltd., who remarked that in the Port of Liverpool, for some curious reason, there was a disposition to place goods on the quays, whereas in London, Hull, and one or two other ports, most of the cargo was delivered overside, and the charges on cargo so delivered were generally much less. That transport costs in the Port of Liverpool might be considerably reduced by a wider adoption of the system of overside delivery of ship's cargoes into barges instead of placing them on the quays, was a point emphasised by Mr. Lissenden. If traders on Merseyside did not devote attention to this problem of overside delivery soon they would find, in all probability, that the importers through other ports, would be getting some advantage. When goods are put on the quays in Liverpool the master porter is entitled to impose charges on a scale fixed in conjunction with the port authority. For that reason, he supposed, there is a disposition to put goods on the quays, but he thought in all fairness to the importers through this port, traders ought to try to get the same system established at Liverpool as has been in operation in other ports for so long. If that were done he thought it would very considerably cheapen the cost of transport. With regard to the problem of rail v. road, Mr. Lissenden said probably the solution would be found in the co-operation of road and rail carriers—indeed, the railway companies had made an excellent move in that direction. Statistics for the 12 months ending 30th September last, show that of a total of 6,619,479 tons of foreign general cargo imported into Liverpool, 1,469,539 tons of grain and 412,934 tons of other classes of cargo were delivered overside from the ships into barges.

The Port of New Orleans.

CONTINUED INCREASE IN NEW ORLEANS SHIPPING.

The number and tonnage of vessels arriving and departing at the Port of New Orleans in November, 1928, and the quantity of merchandise transported over the public wharves, all showed a substantial increase over the records for the same month of 1927. This, according to the figures of the New Orleans Port Commission, is a continuation of the steady increase which has been apparent during the present calendar year.

There were in November 239 arrivals and 244 departures in deep-sea trades. This is an increase of 9 arrivals and 19 departures. The gross tonnage of the 239 arrivals was 935,115, an increase of 76,101 gross tons. Tonnage of goods passing over the public wharves was 369,075 tons, or 22,260 tons more than in the corresponding month of the previous year, this being in addition to the movement of bulk grain and other bulk goods. The public grain elevator received 2,564,262 bushels of grain, and delivered 2,235,876 bushels. The bulk commodity plant handled 26,181 tons of coal and aluminium ore.

The record of arrivals for the month is as follows:—

Flag.	No. of Vessels.	Gross Tonnage.
American	121	519,769
British	26	111,123
Brazilian	3	15,690
Belgian	1	5,086
Dutch	4	24,754
Danish	5	16,402
French	4	27,345
German	6	20,576
Honduran	27	70,025
Italian	4	23,624
Japanese	1	7,367
Nicaraguan ...	5	7,027
Norwegian ...	27	70,600
Panaman	1	668
Swedish	4	15,059
Total ...	239	935,115

RIVER TRAFFIC AT NEW ORLEANS IN NOVEMBER.

Inland watercraft arriving at New Orleans in the month of November, 1928, amounted to 269 vessels of 106,852 tons, exclusive of vessels under 25 tons. This is a decrease of 10 vessels, but an increase of 9,664 tons as compared with the river movement of November, 1927. There also were arrivals of 3,237 logs and timbers in rafts.

The movement under review consisted of 21 Mississippi-Warrior tugs of 16,985 tons; 99 Mississippi-Warrior barges of 58,957 tons; 86 steamboats and power vessels of 9,736 tons, and 63 miscellaneous barges of 21,174 tons. The increase was due to the large number of Mississippi-Warrior barges arriving—23 more than in November, 1927, measuring an increase of 16,437 tons.

NOVEMBER TRAFFIC IN THE NEW ORLEANS INNER HARBOUR NAVIGATION CANAL.

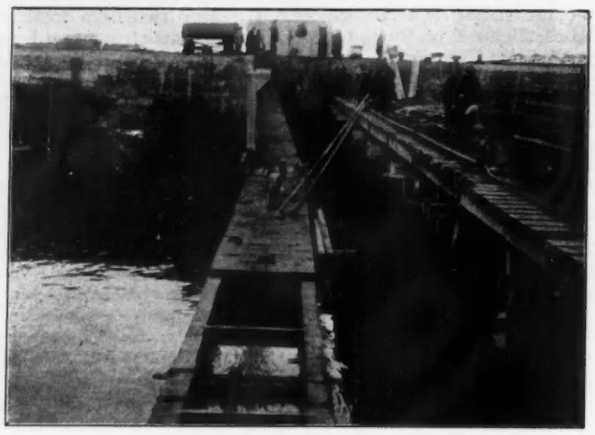
The total movement of vessels in the New Orleans Inner Harbour Navigation Canal for November, 1928, amounted to 772 craft of all classes, with a tonnage measurement of 358,048. This is an increase of 87,948 tons over the traffic accommodated in the same month of the previous year.

This traffic consisted, Northbound, of 51 Mississippi-Warrior vessels of 22,626 tons; 24 ocean vessels of 109,638 tons; 289 miscellaneous craft of 42,712 tons. Southbound, it consisted of 55 Mississippi-Warrior vessels of 24,283 tons; 26 ocean steamships of 113,321 tons; 327 other vessels of 45,468 tons.

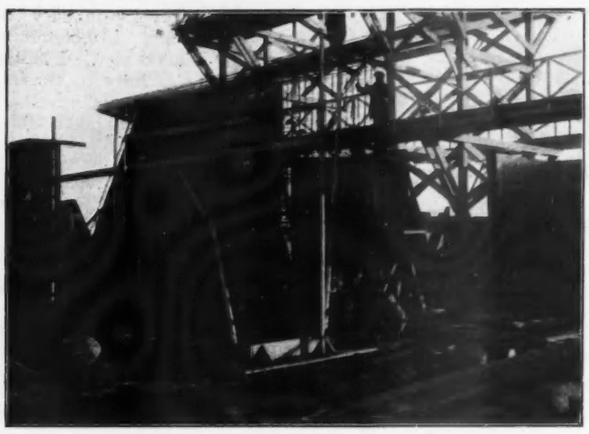
VICKERS (AVIATION), LTD.

It is announced that Vickers (Aviation), Limited, a Company owned entirely by Vickers, Limited, engaged in the manufacture of heavier-than-air craft, has acquired all the share capital of the Supermarine Aviation Works, Limited. The company is engaged in the manufacture of flying boats and seaplanes, and will be remembered as the constructor of the winning machine in the last Schneider Cup race and of the "Southampton" flying boats now engaged on a world cruise. The Supermarine Aviation Works, Limited, will continue as a separate company with the same personnel as heretofore.

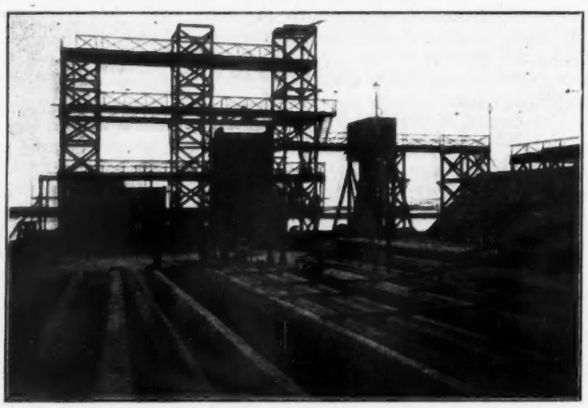
The Port of Havre.



View of the Beams and Wall. March 12th, 1927.



Making Reinforced Concrete Blocks for the Wall.



Recently-cast Reinforced Concrete Piles. In the background, Scaffolding used for casting the Dolphin's Caissons.

Back of Wall. The Concrete Blocks to which the Wall is connected are getting buried into the Spoils.

This Upper Wall Block carries the stumps of the beams which will connect it to the dolphin.

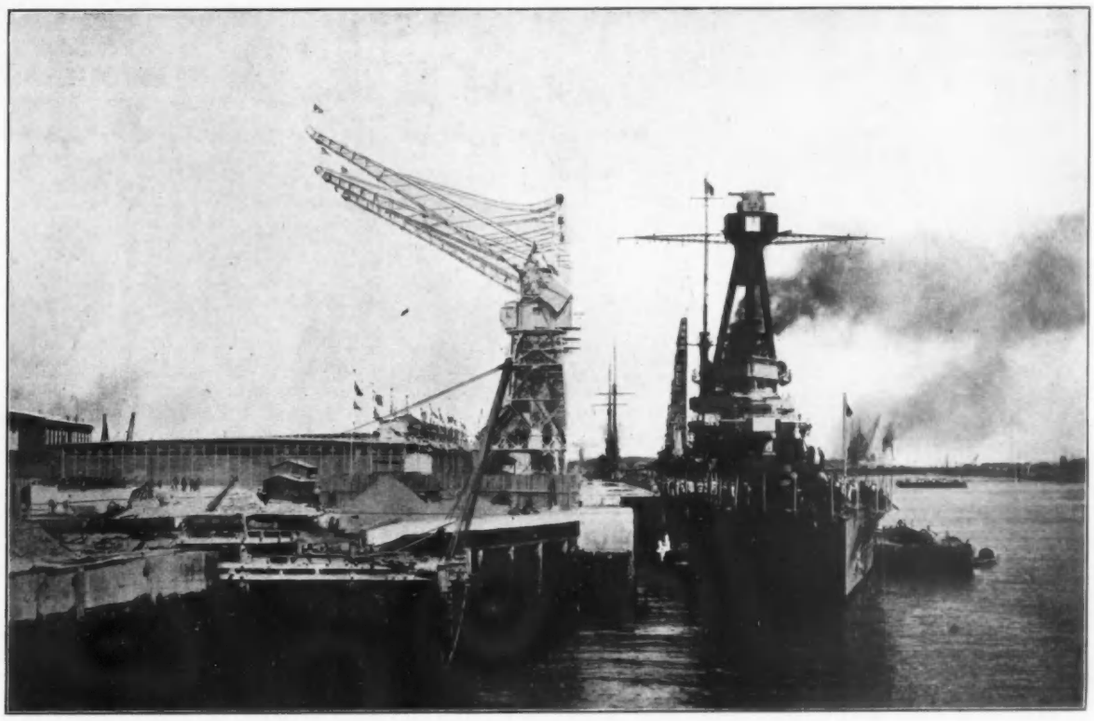
Recently-cast Dolphin. Right: Lower Part of the Dolphin. Left: Middle Part bearing the stumps of the beams which will later connect it to the wall.

Latest Facilities at the Port of Havre.

By ROGER VEVER, Ing.E.C.P.

IN this article we will endeavour to introduce to the reader the facilities which have been recently built in the West half of the big tidal basin.

This tidal basin, put into commission shortly after the Armistice, is one of the many items of the pre-War extension scheme. It accommodates, on the East side, the recently inaugurated graving dock and the French Lines berths of the "Quai Joanne's Couvert," as shown on harbour plan.



June 3rd, 1928. Formal Opening of New Dock by President Doumergue.

Until recently no definite plan had been made for the use of the West half of the tidal basin.

In 1920 Mr. Georges Bourgeois, now a Director of the Havre Harbour Board, founded the "Compagnie Industrielle Maritime." Soon afterwards this new Company was granted by the French State the use of the West half of the tidal basin on a 60-years' long lease, providing that wharves should be built and managed according to particular stipulations.

Mr. Bourgeois' concern was backed by a British firm "The London and Thames Haven Oil Wharves Company, Ltd."

The first work to be undertaken was the building of oil wharves alongside the south sea wall, the Company then started the deep-water dock, put into commission last year.

The "Compagnie Industrielle Maritime" acts as its own contractor, under the name of "La Grande Union." All the "Compagnie Industrielle Maritime's" works were planned and superintended by its Engineer-in-Chief, Mr. Paul Vimont, Ing.E.C.P.

OIL WHARVES.—The oil wharves have been built on reclaimed ground within the sea walls, as shown on harbour map. As regards lay-out and equipment, the Havre plant is a smaller size replica of the Thames Haven Oil Wharves; it has besides the tank farm and pumping plant a filling station for both rail and road tank cars and a gas freeing berth; a refinery is in course of construction. The aerial view of the oil wharves shows how thoroughly isolated they are from other docks. A folding floating gate closes the entrance to the oil basin and would prevent oil from spreading into the tidal basin.

The gate is made of three horizontal cylinders linked to one another, the extreme ones being guided by one vertical groove when moving with the tide. The tanks are surrounded by walls for stopping leaking oil.

The oil depot is run in the same way as a bonded warehouse and may, therefore, be used by any importer.

Data Concerning the Oil Wharves.—Size of basin—Length, 270 metres; breadth, 170 metres; depth, 10 metres below the zero of the Marine Charts. Number of tanks, 33. Total storing capacity, 125,000 metric tons.

Pumping Plant.—Six steam-driven pumps, each handling between 200 and 300 tons of oil per hour.

Banks of the Wharves.—The banks, 1,675 metres long are, for the greater part, made of fascines and rubble. Concrete blocks having the shape of a sloping wall, cast on land and carried by floating crane to the banks are now used for further extensions. This new process has proved cheaper and faster than fascines and rubble.

COMPAGNIE INDUSTRIELLE MARITIME'S SHIPPING FACILITIES.

Deep-Water Berths.—The length of the quay, now about 300 metres, will be extended to 600 metres, and two berths dredged to 14 metres below the zero of the Marine charts, will soon be available. Havre will, therefore, be able to accommodate at the same time two of the biggest liners afloat.

Crane Facilities.—The new dock is provided with five gantry cranes, built by Messrs. Baudet, Donon et Roussel, of Argenteuil, near Paris.

Data Concerning the Cranes.—Lifting capacity, two tons at the speed of 1.50 m. per second and five tons at the speed of 0.60 m. per second. Power of lifting motor, 55 h.p. Maximum radius 26.55 m., minimum 6.55 m. Level luffing speed, 20 metres in 16 seconds; power of level luffing motor, 10 h.p. Maximum height of load above quay level 30.65 m. Slewing speed one revolution in 50 seconds. Power of slewing motor, 20 h.p. Height available beneath gantry, 5.37 m. Travelling speed, 0.20 m. per second. Power of travelling motor, 20 h.p. Span of gantry, 8.70 m.

RAILWAY FACILITIES.

The railway facilities as shown on special map are the outcome of a joint study by the Port Authority and French State Railway's representatives. Cranes span only one of the two quay side lines.

TRANSIT SHED.

One storey, flat roof, built on piles over reclaimed ground; it borders the quay apron and is located between the two berths and may be later extended at both ends. Length 336 metres; breadth, 55 metres. The concrete floor slopes up to the level of railway cars.

ACCOMMODATION FOR PASSENGERS AND LUGGAGE.

A large corridor, well sheltered from wind and rain, runs along the roof of the shed and leads to the ship's gangways, carried by moveable gantries, and to staircases, waiting rooms,

etc. Electric truck, trailers and belt conveyors deal rapidly with mail bags and cargo.

Hotel for Second and Third Class Passengers.—Large and up-to-date bungalows have been built by the Compagnie Industrielle Maritime at " Cape de la Hève," on top of the cliffs of St. Adresse, and are to be used by emigrants in connection with sailing from the new dock.

Data Concerning Hotel.—Total area of grounds, 25 acres; housing capacity, 1,100 emigrants. More bungalows may be added later on. There are four beds only in each room.

DESCRIPTION OF QUAY.

The quay as shown on special plan, is made of three independent parts, namely: (1) the wall, (2) the pier, (3) the dolphins.

The Wall.—The wall is built on two lines of concrete piles, driven into the sea bottom, cut at the required level and connected to each other by means of horizontal concrete beams (see plan and photographs). Concrete wall blocks with a large basis and two buttresses lay along two rows, the lower blocks, having their basis upwards, hang from the beams while the upper blocks, which are longer and higher rest on top of the lower ones; the bases of both upper and lower blocks

Lifting the Crane Jib on to the Gantry.

are of the same width and are both on the same level as the beams. The upper wall is tied through rods to concrete blocks, resting on wooden piles, and buried into spoils some distance from the quay.

The Pier.—The pier, thoroughly isolated from either the wall or the dolphins, is made of piles connected by horizontal beams (see plan and photographs). The pier has been designed to withstand vertical strains only, the dolphin coping with ship's pressure.

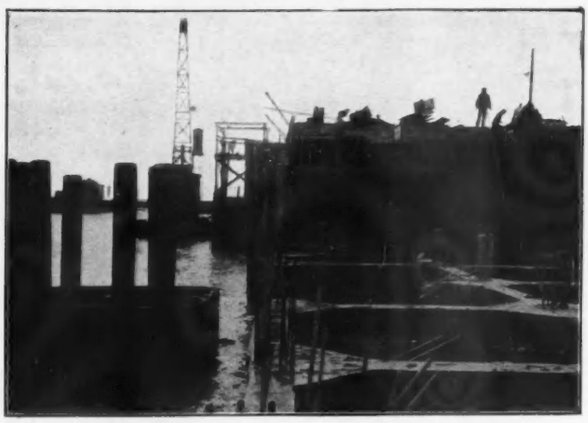
The Dolphins.—Concrete dolphins have been placed in front of the pier and have been built in the following way: A reinforced concrete caisson open at both ends and divided into nine channels by means of six partitions, has been cast on land and carried to a suitable berth where it has been sunk. One pile was then driven through each channel into the sea bottom and vacant space filled with concrete. A shorter caisson was set on top of the first, being united to it by the piles and concrete fillings. The top of the dolphin bearing one bollard, was cast on the spot. The second caisson and the top of the dolphin are connected to special upper wall blocks by means of horizontal beams distributing the ship's pressure on a large surface of wall. These beams go through the pier supported in their middle, but are by no means tied to it. Shocks on the dolphins, therefore, will not affect either the pier or the ordinary upper wall blocks.

BUILDING PROCESS.

The first operation was the dredging of a suitable berth, then the building of a wooden pier supporting first the pile driving plant and later cranes for handling rubble.

The concrete piles after being driven were cut at the required level and connected to one another by beams, cast at low tide only.

The caissons for the dolphins, the wall blocks and the piles were cast on land at the " Epi Nord " pier (see plan) and later carried to the quay and laid into position by means of a 200-ton floating crane, built by Messrs. Smulders Werf Gusto, Schiedam, Holland, and sister ship of the Mammoth, owned by the Mersey Dock and Harbour Board, Liverpool.



Left: Lower part of Dolphin through which 9 Reinforced Concrete Piles have been driven into the Sea bottom. The space round the Piles has been later on filled with concrete. The middle part of the Dolphin will be united to the lower one through the Piles and Concrete Castings. Right: Lower Beams of the Pier.

To obtain a flat area on which to put the dolphin a steel cylinder had to be lowered, suction dredgers and divers smoothed and deepened the berth to the required level; the steel cylinder was removed after the dolphin had been sunk.

Data Concerning the Quay.—Wall Blocks: Lower block, length from 3.35 m. to 4.28 m.; weight (of the heaviest type of block), 13.4 metric tons; volume, 5.374 cubic metres. Upper blocks: size of block linked to the dolphins: Length 10.75 m.; weight 115.4 metric tons; volume 46.16 cubic metres.

Pier.—Supported by four lines of piles of the following size.

Number of Reinforced Concrete Piles.	Diameter.	Length of Pile before driving it.	Weight.
	Metres.	Metres.	Kilograms.
154	0.40	18	5,860
186	0.40	20	6,522
150	0.50	21	10,690
148	0.50	23	11,727

(Shape Octagon).

Floating Pile-driving Plant, by Messrs. Dyle et Bacalan, at work at the end of the Quay.

Beams connecting piles to one another, height 0.40 m., breadth 0.40 m. Square piles joining the lower beam to top of pier and cross beams, 0.40 m. by 0.40 m.

PORT OF HAVRE.

& THE CONCESSION OF THE COMPAGNIE INDUSTRIELLE MARITIME.

UNDER THE JURISDICTION OF THE HAVRE HARBOUR BOARD.

Engineer-in-Chief to the Compagnie Industrielle Maritime;- Monr. Paul Vimont, Ing. E.C.P.

NOTE;- Extensions Completed or in hand are coloured RED.

PARTICULARS OF THE CONCESSION OF THE COMPAGNIE INDUSTRIELLE MARITIME.

Total Area of the Concession... 63 Hectares

OIL WHARVES
- Number of Tanks 33
- Total Capacity ..... 125,000 Cub. Metres.
- Oil Basin { Length ..... 200 M. (minimum); Breadth ..... 80 M.; Depth ..... 10 M.
- Area of South Portion edged Red... 20 H. 46

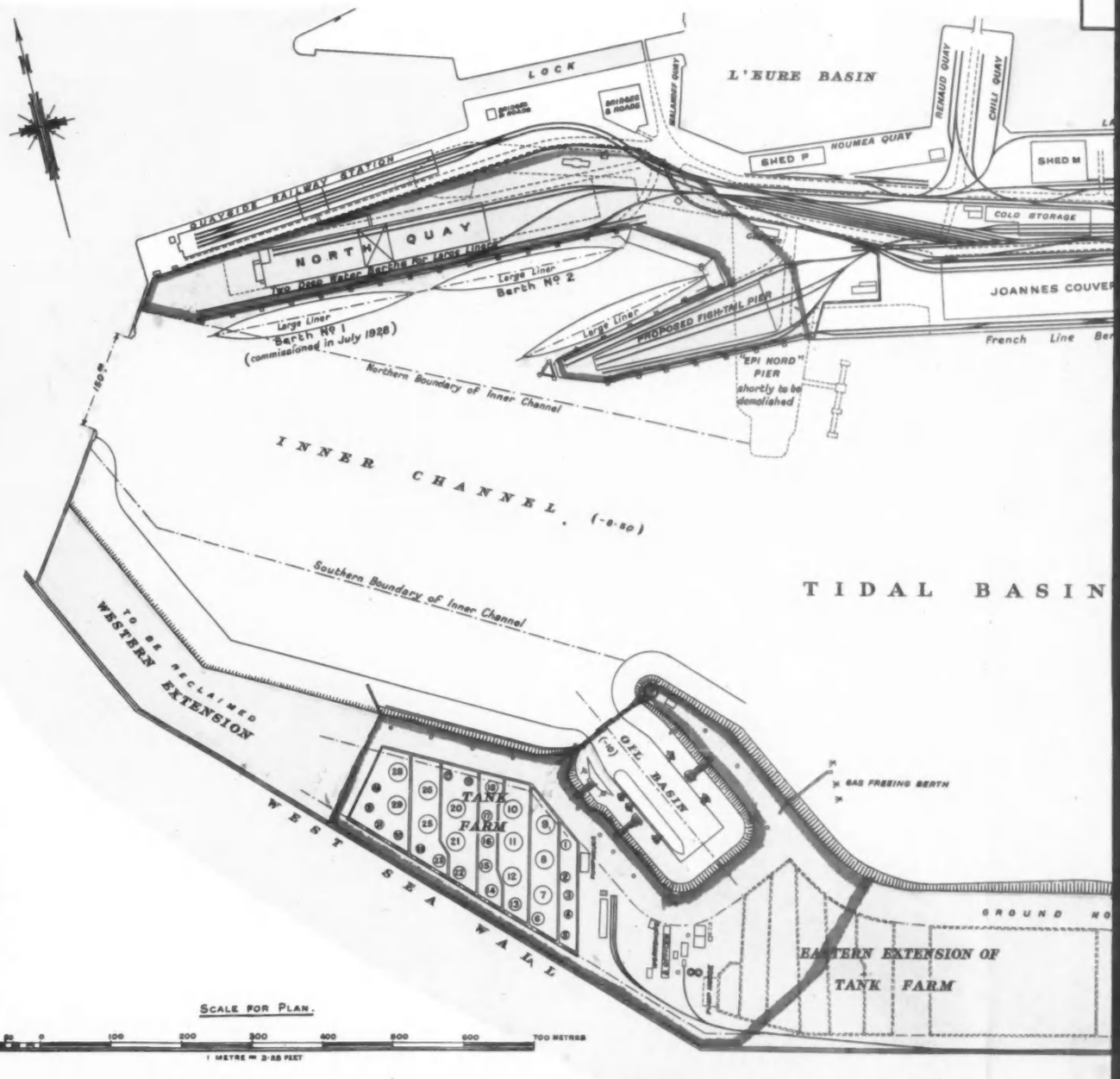
DEEP WATER QUAYS
- North Quay, Length 600 M. Depth (-14·00)
- Fish Tail Pier ... " ... 675 M. ... " ... (-14·00)
- Area of North Portion edged Red... 17 H. 38

COAL QUAYS (Proposed)
- Length of Quays ..... 650 M. ... Depth (-10·00)
- Area of Quays ..... 2 Hectares
- Storage Capacity;- 4 Yards of a total of 40,000 Metric Tons.

CRANES AT DEEP WATER QUAYS
- 5 Electric Gantry Cranes lifting 2 Tons at 1·50 m. per second & 5 Tons at 0·60 m. per second - Max. Rad. 26·55 m. - Min. Rad. 6·55 m. - Max. Height of Load above Quay 30·65 m. Height beneath Gantry 5·37 m. Span of Gantry 8·70 m.

200 TONS FLOATING CRANE SIMBAD.

Load	Reach	Max. Height of Load.
200 Tons	20 Metres	45 Metres
200 "	17 "	50 "
60 "	43 "	31 "
60 "	23 "	57 "



DOCK AND HARBOUR AUTHORITY, JA

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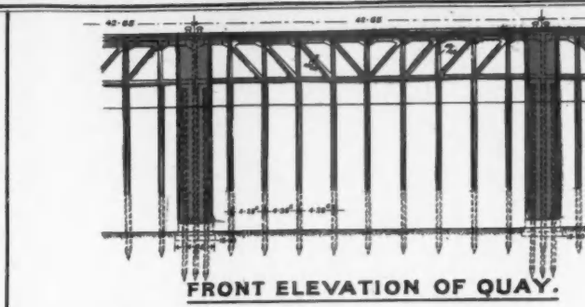
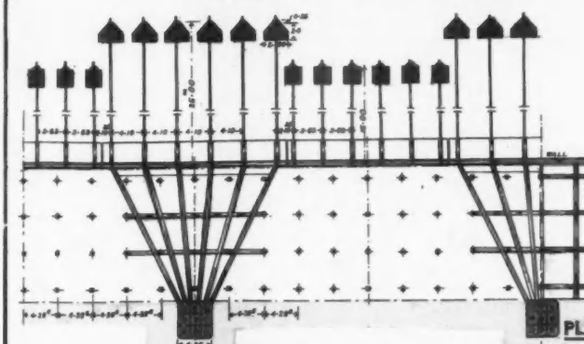


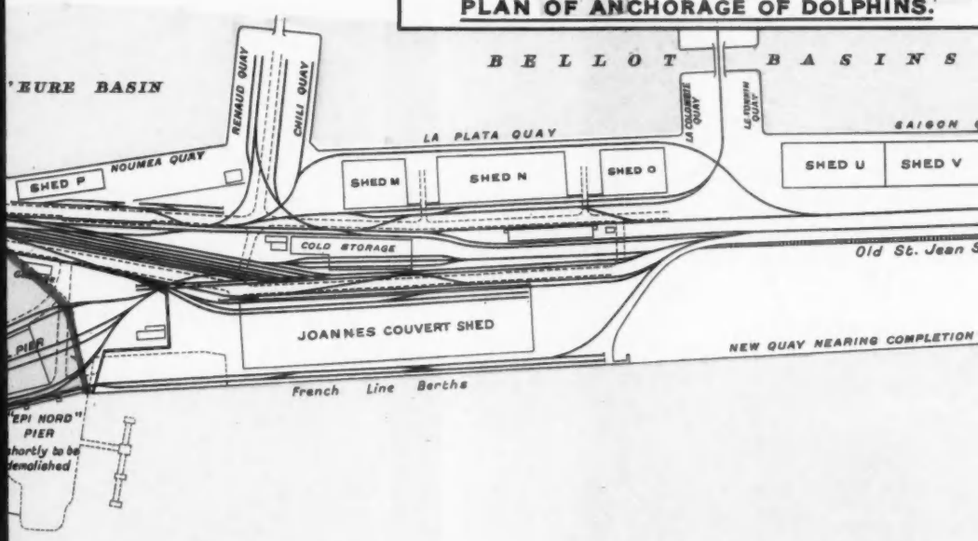
FRONT ELEVATION OF QUAY.

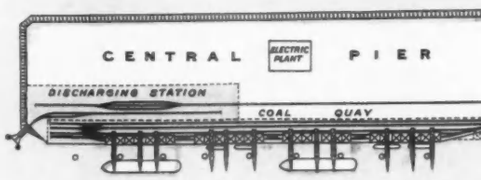


PLAN OF ANCHORAGE OF DOLPHINS.

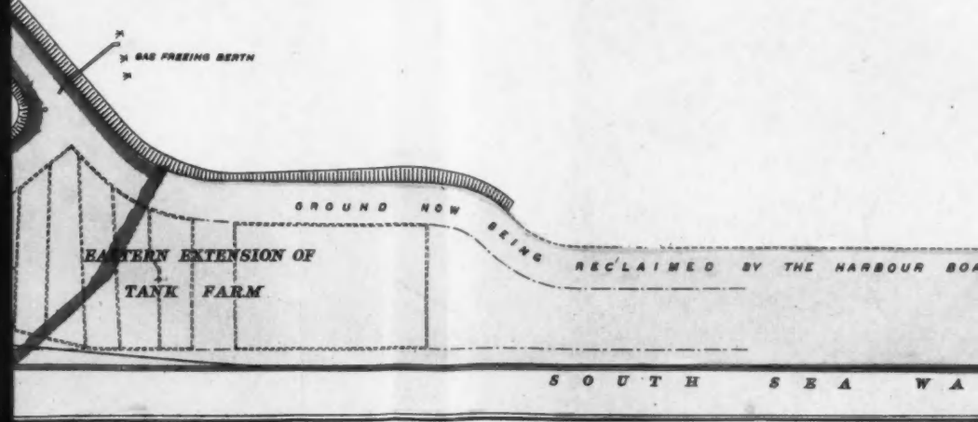
200 TONS FLOATING CRANE SIMBAD.

Load	Reach	Max. Height of Load.
200 Tons	20 Metres	45 Metres
200 ,,	17 ,,	50 ,,
60 ,,	43 ,,	31 ,,
60 ,,	23 ,,	57 ,,

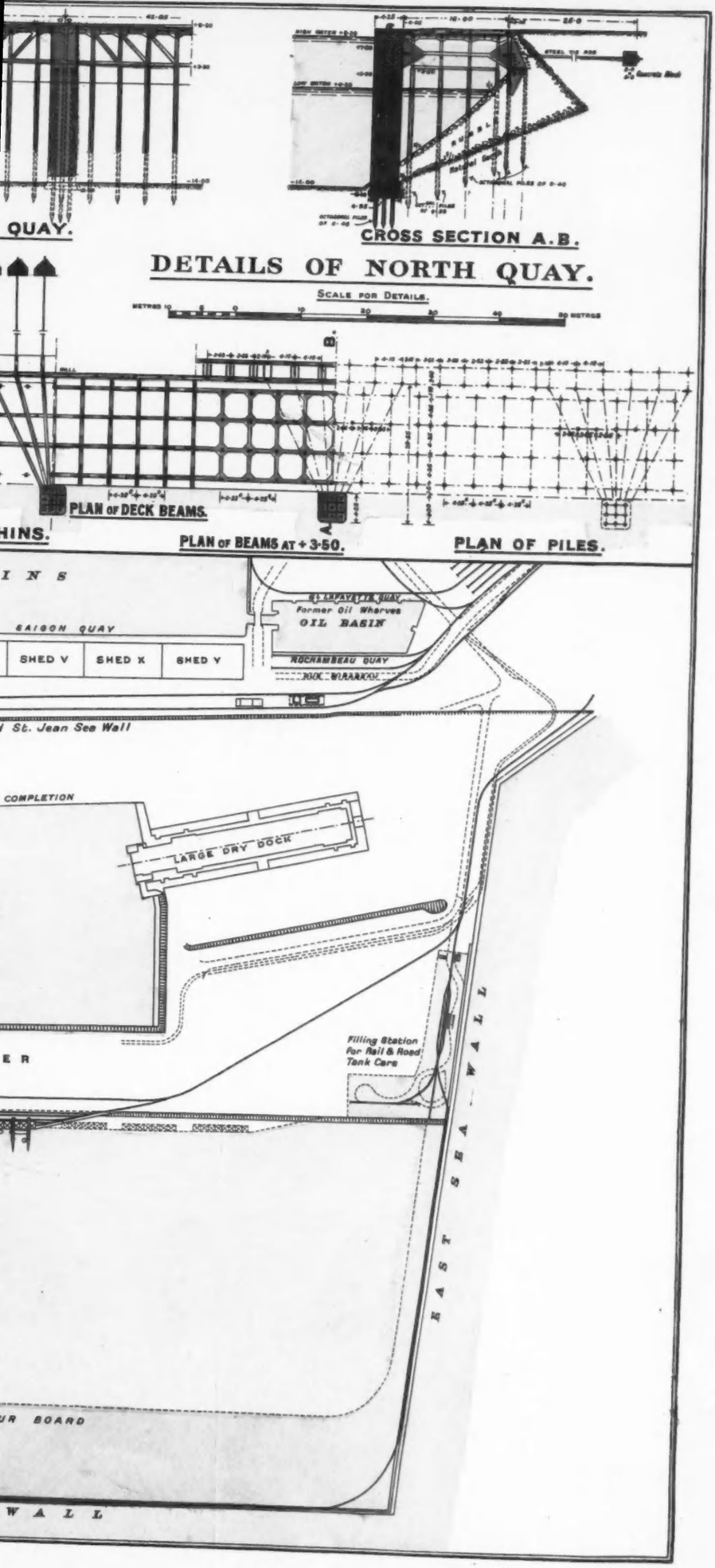




TIDAL BASIN

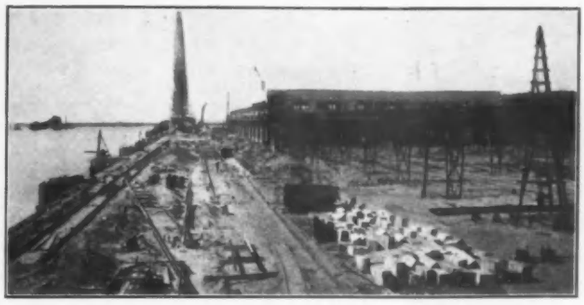


WARD & FOXLOW, Harcourt St. Marylebone. W.1. 5239


QUAY.
CROSS SECTION A.B.
DETAILS OF NORTH QUAY.
SCALE FOR DETAILS.
PLAN OF DECK BEAMS.
HINS.
PLAN OF BEAMS AT +3·50.
PLAN OF PILES.
I N S
SAIGON QUAY
SHED V
SHED X
SHED Y
Former Oil Wharves
OIL BASIN
ROCHAMBEAU QUAY
St. Jean Sea Wall
COMPLETION
LARGE DRY DOCK
E R
Filling Station
For Rail & Road
Tank Cars
EAST SEA WALL
UR BOARD
W A L L

The Port of Havre.

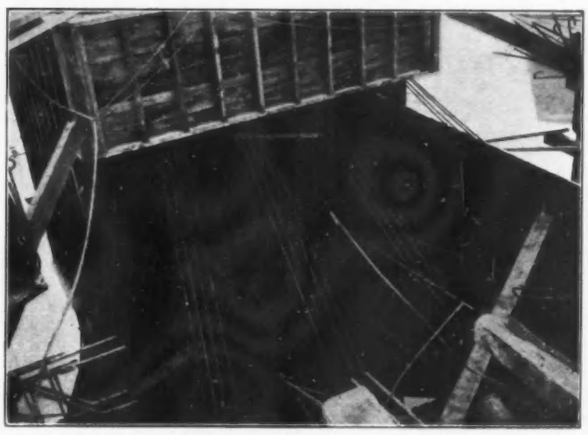
Inside View of Shed. July 7th, 1928.



East end of the Quay. Railway Tracks are being laid on to the Apron.

About to cast the Upper Beams of the Pier.

Left: Beams of the Pier. Right: Top of Lower Wall Block. Note that the Pier is by no means connected to the Wall.



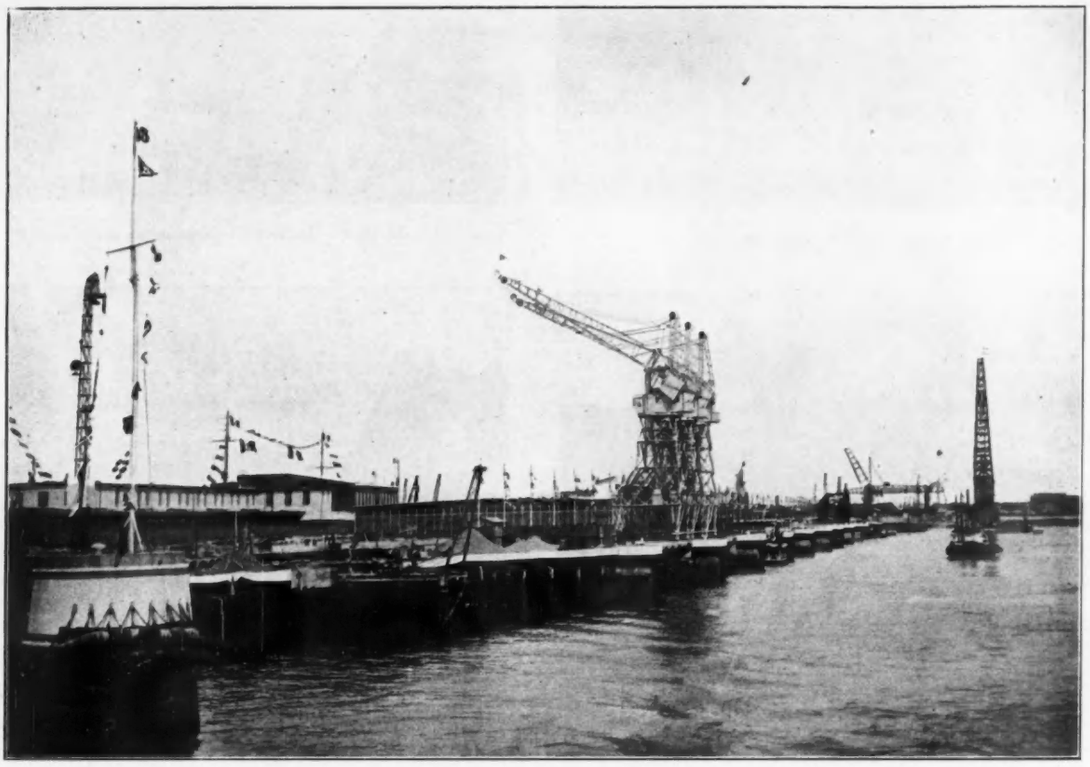
Top of Dolphin and Beams connecting it to the Wall before casting the Concrete.

Driving Piles into the Sea bottom through holes of Dolphin.

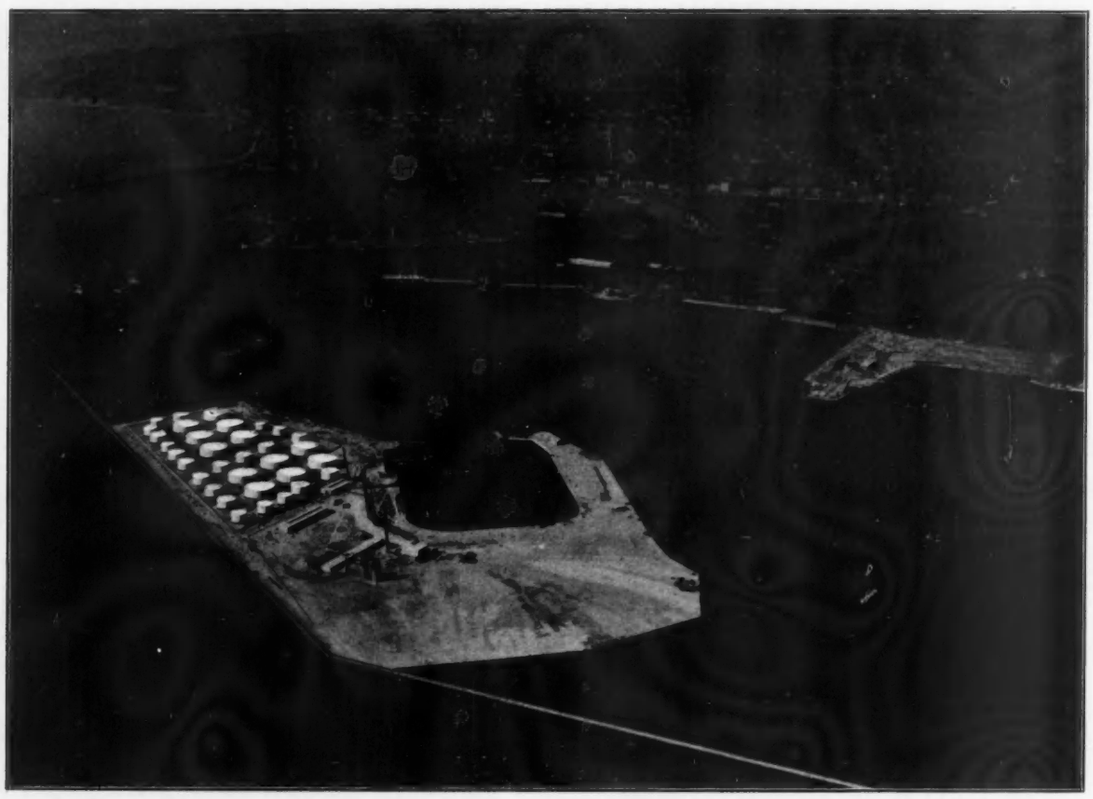
Low Tide View taken underneath the Pier and showing shape of beams.

View of the lower beams of the Pier. Rubble is being tipped through Hopper and Channel so as to jamb the Piles.

The Port of Havre.



General View of the Deep Water Dock.



Aerial View of the West side of the Tidal Basin after the completion of the Oil Wharves and before starting the Deep Water Dock Work.

Pier floor 0.10 m. thick; the pier is designed to stand a load of 4,200 kgs. per square metre.

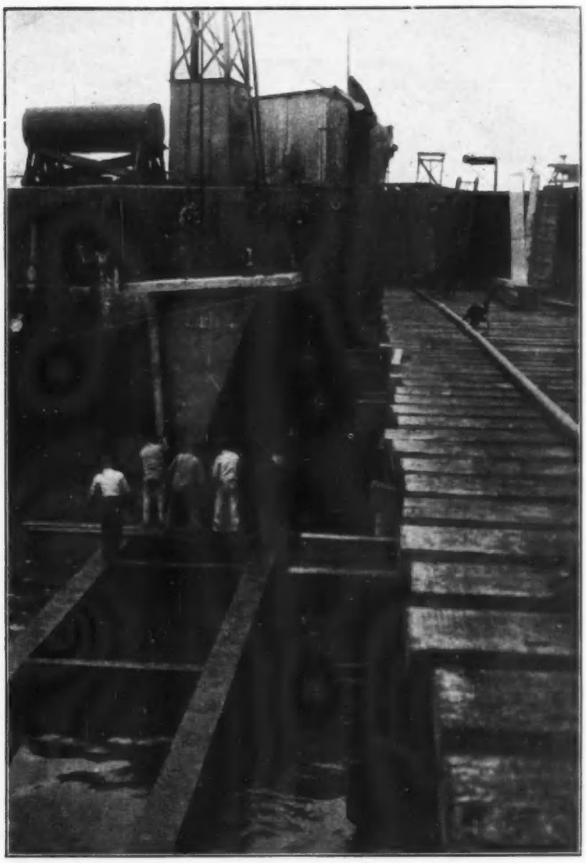
Dolphins.—Number of dolphins, 15; distance between two dolphins 42.857 m. Each dolphin may stand a 500-tons pressure from the docking ship and a pull of 100 tons.

Weight of Lower Caisson, 180 metric tons; total weight of the complete dolphin filled with concrete, about 1,200 metric tons.

COMPOSITION OF CONCRETE.

The cement used was quick set aluminous cement from the Lafarge Mills.

The concrete had the following composition: Aluminous cement, 250 kgs; pebble, 750 litres; sand sifted through wide-mesh sieve, 400 litres, and through narrow sieve, 50 litres. The quick set Lafarge aluminous cement gives to concrete a great tensile strength.



Lowering Bottom Wall Block. February 25th, 1927.

Ratio of Steel in Reinforced Concrete.—Piles, 210 kgs. per cubic metre; wall and dolphins, 160 kgs. per cubic metre.

Average Driving Depth of Piles.—5 metres.

Pile Driving Plant.—Weight of hammer, 5 metric tons, maximum stroke 1.30 m.

200-TONS FLOATING CRANE SIMBAD.

Load.	Reach.	Maximum Height of Load.
200 tons	20 metres	45 metres
200 tons	17 metres	50 metres
60 tons	43 metres	31 metres
60 tons	23 metres	57 metres

MERSEY DOCKS AND HARBOUR BOARD.

To celebrate the 50th anniversary of the establishment (in 1878) of the traffic department of the Mersey Docks and Harbour Board as a separate entity, a dinner was held at Liverpool on December 8th. Mr. Albert Foulkes, the Chief Traffic Manager, presided, and in proposing the main toast, recalled the wonderful changes that had taken place in traffic management during the past 50 years. Many matters now accepted as every-day affairs were the subject of long and anxious consideration years ago and in fact it was largely due to the spade work of the past that the quay traffic of to-day worked so smoothly. It was difficult to foresee what changes there would be in the next 50 years, but he believed they would be as great as in the past. If they were to hold their own as a commercial country they must eliminate all unnecessary expenses in their industries without sacrificing efficiency.

New Marconi Beacon Station at Start Point.

A wireless beacon installation, built at Start Point by Marconi's Wireless Telegraph Co., Ltd., for the Corporation of Trinity House has just been completed.

This type of station transmits a special signal on an exclusive wavelength of 1,000 metres for the benefit of ships equipped with wireless direction finders. The Start Point installation is the seventh of its kind now established round the British coasts, others having been installed at Round Island, Skerries, Spurn Lightship, The Casquets (Channel Islands), Start Point, Bar Lightship, Albatross (Coningbeg, Ireland), and in the near future further beacon stations of the Marconi type will be installed at Sule Skerry (Scotland), Lundy North, Dungeness, Kinnaird Head (Scotland), Cromer, South Bishop, and other places, in addition to similar stations for which orders have been received in other parts of the world.

The completion of the Start Point transmitter means that very effective cross bearings can now be taken by ships using the three Channel stations as their fixed points and they can thus obtain a sequence of bearings whenever required by the navigators and can be sure of their position right up the Channel.

Since the wireless direction finder has become firmly established and more generally employed on the merchant vessels of the world the demand has arisen for the erection of permanent installations situated at places of advantage from a shipping point of view round the coast, and whose function it is to send out a recognised signal at convenient intervals purely for the purpose of enabling ships fitted with direction finders to take their bearings and thereby find their exact position when approaching the coast.

One of the great advantages of the system of position finding in which a wireless beacon station of the Marconi type at a known position is used in conjunction with a direction finder on board ship is that the signals are broadcast in all directions and a direct bearing can therefore be taken on the transmitter from any direction at every signal sent out by it. This method is, therefore particularly suitable for lightship installation, as the swinging of the ship's head does not affect the accuracy of the bearing obtained, and navigators can lay off their wireless bearings on familiar points on the chart.

The Marconi Beacon transmitter of the type fitted in the British Isles has a power of 500 watts and is operated on a wavelength of 1,000 metres, which is the specified wavelength for wireless beacon stations, and the whole equipment is automatically controlled by a master clock for transmitting groups of interrupted continuous wave (I.C.W.) signals at prearranged intervals.

The call sign of the Start Point station is GSM, and accurate direction finding bearings may be expected up to about 100 nautical miles under normal atmospheric conditions.

VICKERS—ARMSTRONGS, LTD.

Messrs. Vickers—Armstrongs, Limited, have received an order for three sets of endless rope haulage gears arranged for driving by electric motors. The fleeting wheels are fitted with renewable cast steel treads and are driven by combined worm and spur reduction gears. The capacity of each haulage is 600 tons at 75-ft. per minute. The three equipments are complete with tension terminals, haulage carriages and enclosed runway for the same, together with the steel haulage ropes.

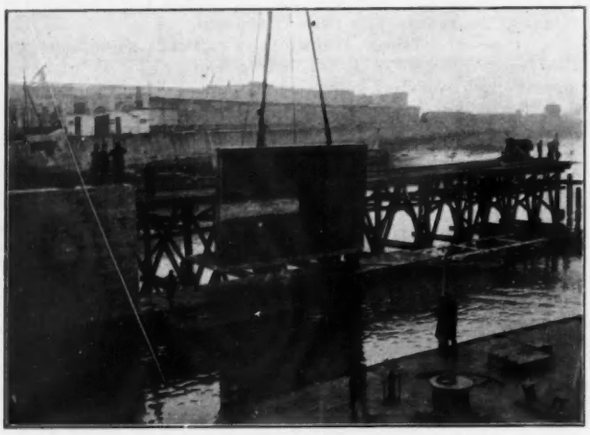
KIEL CANAL TRAFFIC IN OCTOBER, 1928.

A report received by the Department of Overseas Trade from His Majesty's Consul-General at Hamburg, states that a slight decrease in the volume of traffic through the Kiel Canal was apparent during the month of October, 4,709 vessels, aggregating 2,110,210 net reg. tons passing through the Canal, as against 5,102 vessels of 2,158,497 net reg. tons in the previous month. Compared with October, 1927, there is a drop of approximately 300 vessels and an increase of 35,000 tons. Of the 4,709 vessels 2,594 were registered as sea-going steamers aggregating 1,941,526 net reg. tons and 30 motor vessels of a total net reg. tonnage of 27,650 tons; 2,424 were cargo and passenger vessels aggregating 1,935,187 net reg. tons, 151 tugs aggregating 5,661 net reg. tons, 9 fishing steamers of 7,678 net reg. tons, 1,891 sailing vessels, aggregating 98,988 net reg. tons, and 182 were lighters and barges of together 50,802 net reg. tons.

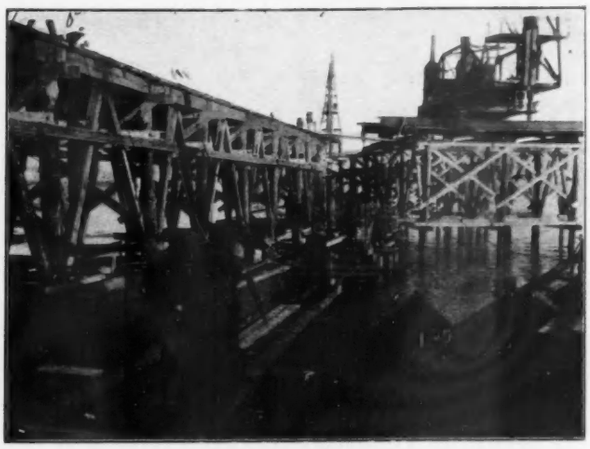
The vessels were loaded as follows:—Fourteen with passengers, 255 with coal, 93 with stone, 46 with iron, 617 with timber, 624 with grain, 21 with cattle, 857 with ores and other goods in bulk, 1,117 with piece goods, 95 with general cargo, 968 empty or in ballast (about 20 per cent. of the whole traffic).

Personal enquiries regarding shipping and transport matters should be made at the City Office of the Department (Shipping and Transport Section), 73, Basinghall Street, London, E.C.2.

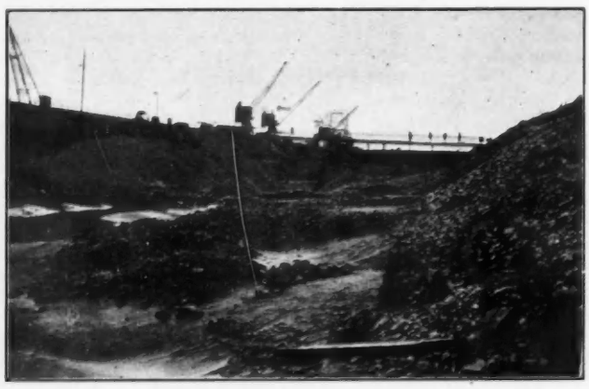
The Port of Havre.



Putting Upper Wall Block on top of lower one.

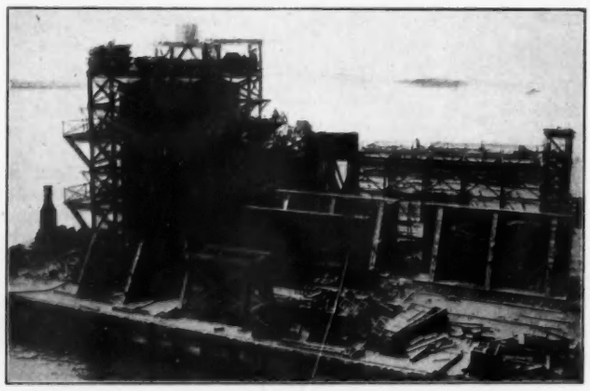


View of temporary Wooden Pier supporting Pile-driving Plant, seen in foreground. The distant jib is that of the Floating Plant which drove the Wooden Piles. Photograph taken on February 15th, 1927.

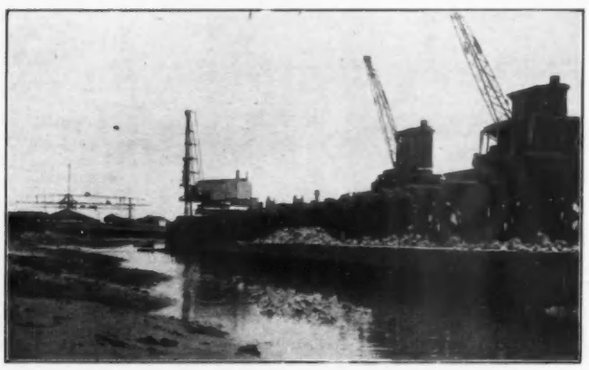


Tipping Rubble behind the Wall.

Reclaiming Plant.

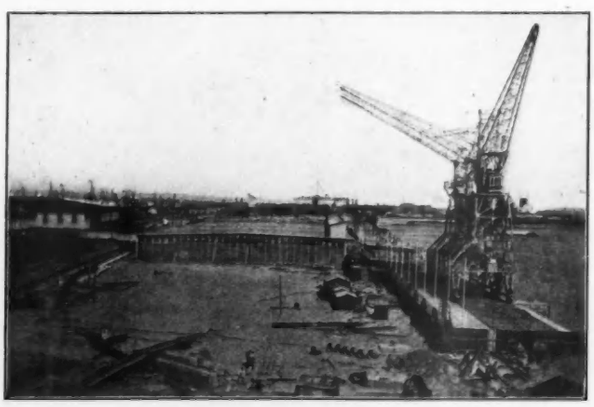


Casting parts of Dolphins and Wall to be later carried on to the required place by means of the 200-tons Floating Crane.



Back of the Quay. The Lower Blocks of the Wall have been set between the Beams. Rubble is being tipped on both sides of Wall.

(A) A and B are photographs taken from the same place on September 1st, 1927 and June 30th, 1928, respectively.

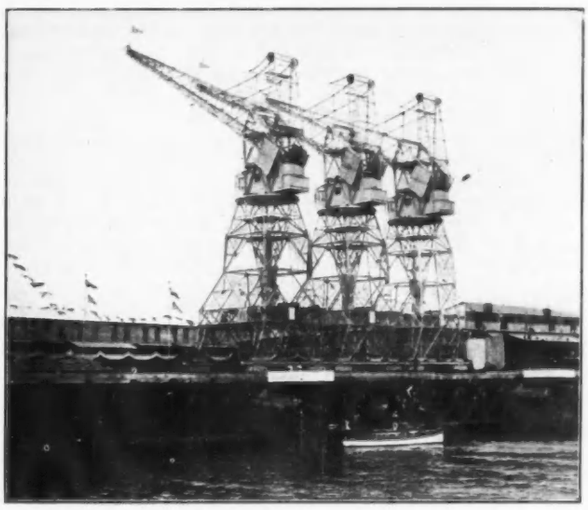


(B) June 30th, 1928. The Dock is soon to be put into Commission.

The Port of Havre.

Edge of Quay and Top of Dolphin.

Early stage of the Building Work. Two Well Bucket Dredgers digging Berths prior to the driving of Piles. February 27th, 1927.



Low Tide View of the completed Quay. Three of the five Gantry Cranes built by Messrs. Baudet Donon et Roussel, of Argenteuil, near Paris.

Reclamation Work about to be ended. May 15th, 1928.

Reclamation Work nearing completion. Erecting Crane Gantries by means of 200-tons Floating Crane.

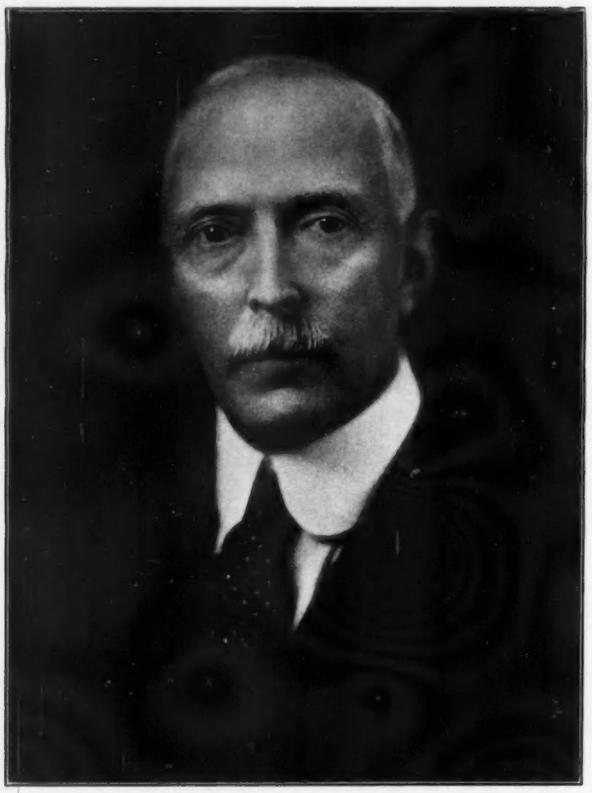
Lower Caisson of Dolphin on board Floating Crane. Right: Upper Wall Block temporarily resting on a float.

The Lower Caisson of the Dolphin hanging above the Berth into which it will be sunk. July 31st, 1927.

American Harbour Personalities.

V.—Mr. G. B. HEGARDT.

Mr. George B. Hegardt is the patriarch of port engineering on the Pacific Coast of the United States, and occupies a position of distinction there and elsewhere in the port circles of the United States which is difficult to classify. He has to his credit a record of unusual successes as an engineering and administrative port official which certainly cannot be surpassed by any now in similar service, and this might be enough to make of him a very well-known and honoured man. But Mr. Hegardt's renown rests much more securely on the confidence which the people of the Western ports place in his opinions and in his professional skill. He is an exceptionally modest man, and in seeking some particulars for this brief sketch, the effort to draw from him a list of the port projects with which he has been associated met only with a mild evasion. The fact is that there is scarcely a port project on the Pacific Coast —including that of Canada—but that Mr. Hegardt has been concerned in it at least in a consulting capacity.



Mr. G. B. HEGARDT.

At present he is General Manager and Chief Engineer of the Board of Port Commissioners of the City of Oakland, Calif., and President of the American Association of Port Authorities —an organisation which embraces the authorities of nearly all United States and Canada ports and several overseas authorities. Incidentally, he was elected to this latter position last year by acclamation at a time when his health prevented his presence at the annual meeting and when he had urged his intimates not to present his name for election.

Mr. Hegardt's early career after receiving his degree in civil engineering was with the United States Engineering Corps. For two years he was with the Engineers at Chicago, then, in 1886, was placed in local charge of improvements on the Illinois River, which involved the construction of two locks and dams at La Grange and Kampsville, Illinois. These locks, each 75-ft. wide and 350-ft. long between gates, of cut-stone construction, were at that time considered of considerable magnitude, and completed the slack river navigation project between Chicago and the Mississippi River, some distance above St. Louis.

On completion of this work, Mr. Hegardt was transferred to the work of constructing the locks at the Cascades of the Columbia River. From that time he was identified with the North-West waterways and harbours. The Cascade locks were the largest locks in the United States at the time of their construction. With these completed, early in 1889, he was placed in local charge of the extensive Federal improvements at the mouth of the Columbia, consisting at that time in the construction of a rock jetty or retaining wall which extended 4½ miles into the Pacific Ocean, and cost, completed, $3,800,000. The project was intended to deepen the draft over the Columbia River bar from 18 to 30-ft. at low water, and this was accomplished in that the desired depth was obtained. It was not permanent, however; in 1902 Congress adopted a new project providing for a three-mile extension of the south jetty and the construction of a two-mile north jetty, calculated to give a low-water depth over the bar of 40-ft. This was completed in 1917 and was completely successful, the effect of the jetties having brought into being a permanent low-water depth of 47-ft. over the bar. The total cost of the complete improvement was about $16,000,000.

While this jetty construction was in progress Mr. Hegardt also had local charge of the construction of the modern fortifications at Forts Stevens, Columbia, and Canby, at the mouth of the Columbia. Several years before the completion of the jetties he resigned from the Government service and went into private practice as a consulting engineer at Portland, Oregon.

In 1910 the City of Portland organised the Commission of Public Docks as a separate municipal department, with broad powers for the creation of public-owned ocean terminals. This body, however, did not begin to function until 1912, when G. B. Hegardt was engaged as General Manager and Chief Engineer. He immediately set about preparing a plan for the expenditure of the first $2,500,000, for which bonds had been authorised, and in 1913 this comprehensive plan for the reconstruction of the port, along modern lines, was completed and adopted. In brief it can be stated that the facilities then begun were expanded into a building program which lasted more than 10 years and involved the expenditure of over $10,000,000, creating a modern port and saving to Portland a commercial importance which had practically been lost by reason of failure to provide the terminal requirements of shipping. A complete system of quays and piers, export grain elevator, bulk oil storage plant, cold storage, and ventilated apple storage warehouse, all under the most efficient methods of operation, are the physical tributes to Mr. Hegardt's term of office. They have resulted in a great increase of trade and, as a whole, already have become practically self-supporting.

During that period Mr. Hegardt was called in as consulting engineer on many port projects of the West Coast. A list of these and an account of Mr. Hegardt's part in each would require the preparation of a separate sketch. The most important, however, was the last—a survey and report for a comprehensive plan for developing the harbour of Oakland, on San Francisco Bay. This work was carried out in association with Dr. Charles B. Marx, Professor Emeritus of Civil Engineering at Leland Stanford University, and Colonel Charles T. Leeds, of Los Angeles. Their recommendations were adopted by the City of Oakland, and a bond issue of $10,000,000 was voted for carrying them to conclusion. (The report has been published and presumably is still available from the City of Oakland).

Early in 1926 Mr. Hegardt was selected as Chief Engineer and General Manager of the Port of Oakland. The plan is being carried out, and about $3,000,000 of the authorised $10,000,000 have been expended to date. It is expected that the complete $10,000,000 project will have been completed by 1931.

The most spectacular achievement of Mr. Hegardt's career, however, has been the creation of Oakland's air port, the most famous air port of the United States, if not the finest. It has been developed by the Port Commission at an expenditure of over $1,000,000, and has been the starting point for all trans-Pacific air flights, including the several which have failed. This field is the child of Mr. Hegardt's dreams, a model air port, the success of which has made him an air port authority recognised as such almost as definitely as he is the recognised genius of ocean terminal construction on the Pacific Coast.

He is first Vice-President of the National Airport Association, President of the American Association of Port Authorities, former Secretary of the Pacific Coast Association of Port Authorities, member of the American Society of Civil Engineers, of the Western Society of Civil Engineers, of the Permanent International Association of Navigation Congresses, and of many other engineering societies and associations.

FACILITIES AND CHARGES ON VESSELS AND GOODS IN LATVIAN PORTS.

The Department of Overseas Trade has received from His Majesty's Consul at Riga, reports giving details of port facilities and charges incurred by steamers (including disbursement accounts) at Riga, Libau and Windau, together with some particulars of expenses incurred on cargo landed at these ports.

Details have been circulated to steamship owners, brokers, etc., on the Department's Special Register and copies may be obtained by companies of British origin, capital and control upon application to the City Office of the Department, (Shipping and Transport Section), 73, Basinghall Street, London, E.C.2.

Bombay Port Trust.

Administration Report for the Year 1927-28.

GENERAL REMARKS ON THE YEAR'S WORK.

When framing the Budget for the year under review the Trustees, in anticipation of a slight all-round improvement of trade, budgetted for a gross revenue (excluding special receipts) of Rs. 277.92 lakhs, or approximately Rs. 14 lakhs above the actuals of 1926-27. These expectations were realised and the improvement which set in about the middle of the year was well maintained during the closing months. The actual receipts, including surtax, totalled Rs. 281.07 lakhs, an increase of Rs. 17.05 lakhs, or approximately 6½ per cent. on the corresponding figure for the preceding year.

The total ordinary expenditure budgetted for was Rs. 277.31 lakhs, but thanks to the unabated efforts to economise in every direction, the actual expenditure, Rs. 273.54 lakhs, showed a saving of Rs. 3.77 lakhs on the original estimates and was Rs. 1.54 lakhs less than the actuals for the preceding year. Of this reduction Rs. 66,642 was in debt charges. Having regard to the increased volume of trade handled, the reduction in expenditure and in the ratio of working expenses to receipts (50.57 per cent.) is very gratifying.

The budgetted surplus for the year was Rs. 40,729; the actual result was a surplus of Rs. 6,59,517 under the General Account, which has been transferred to the Revenue Reserve Fund, and Rs. 93,950 under Pilotage Account, transferred to the Vessels Replacement Fund. An analysis of the results shows that the improvement over the original estimates was due to an increase of Rs. 2.73 lakhs in receipts and a reduction of Rs. 3.45 lakhs in expenditure.

After transferring the year's surplus the Revenue Reserve Fund stands at Rs. 72.78 lakhs, actual market value being Rs. 67¼ lakhs. It will be observed that, in addition to the Revenue Reserve Fund, the accumulated Sinking Funds and equated loan repayments amount to Rs. 426.65 lakhs while adequate reserves totalling Rs. 88.74 lakhs have been set aside for special purposes such as fire insurance, depreciation and emergency replacements. Capital Works financed out of Revenue Reserve during the years 1916 to 1921 amounted to no less than Rs. 47 lakhs. No capital loan has been raised for the past three years and the capital balances in hand at the end of the year were over Rs. 59 lakhs.

There was no increase in port or dock charges during the year under review. The reductions in scheduled rates and charges effected during the last three years represent in revenue about Rs. 8¼ lakhs per annum.

The cargo handled at the docks and bunders amounted to 6,709,000 tons, an increase of approximately 20 per cent. above the tonnage of the previous year. Imports accounted for about 55 per cent. and exports 45 per cent. of the total tonnage and both shared equally in the improved volume. A detailed comparison of the tonnage figures for the past two years is given in Table A below.

The year was on the whole uneventful as regards trade but the majority of commodities, both import and export, showed a healthy expansion. The most notable exception was raw cotton, the exports of which, 1,784,000 bales, were the lowest for any year since 1920-21 and 33 per cent. below the average of the last five years. Exports of twist and yarn showed a similar falling off. This heavy decline in Bombay's staple export commodity would be disquieting were it not due to abnormal factors, i.e., the competition of the record American crop which included a large proportion of low-grade cotton, the civil war in China and financial troubles in Japan. In view of the situation in the Far East—which has since shown signs of improvement—it is satisfactory to note that the falling off in cotton exports was more than counterbalanced by an increase in practically all the other important export items, notably oil-seeds, ground nuts and manganese ore. Imports, with few exceptions, showed an all-round increase. The volume of piece goods imported showed a substantial increase and was the heaviest for some years past. The decrease under liquid fuel was almost counterbalanced by the increase in kerosene imports and the remarkable expansion in the bulk petrol trade which continued throughout the year, the import figure of approximately 13 million gallons representing an increase of over 200 per cent. in the last four years. In view of the great development in this trade the trustees sanctioned a 40 per cent. reduction in wharfage from 1st April, 1928. Export wharfage on liquid fuel bunkers has also been reduced by 50 per cent. from the same date.

The fumigation of American cotton imported into India through this port continued throughout the year under review and the imports were on a considerably enhanced scale. 221,100 bales were landed and fumigated prior to delivery, as against 138,597 bales in the preceding year, 1926-27. The landing of American cotton at Haji Bunder on the Mazagon-Sewri Reclamation was discontinued during the fair season as it was found possible to accommodate the small quantities imported during the latter half of the year in the Prince's Dock. In view of the unusually large volume imported during the period 1st November, 1926, to 11th July, 1927 (279,760 bales), the Government of India sanctioned a refund of fumigation fees at the rate of 7 annas per bale on the quantity imported and fumigated during this period.

Vessels which entered the docks or were berthed at the Harbour Walls (excluding ferry steamers) totalled 2,027 with an aggregate tonnage of 4,864,344 net register. This is the highest tonnage recorded since 1921-22.

The new steam pilot vessel "Lady Wilson" arrived out from England and took up her duties on 26th September, 1927.

There was a noticeable improvement over the preceding year in the occupation of the dry docks, the number of vessels docked being 194 against 177 in 1926-27. The total tonnage increased to 696,415 tons, being 70,612 tons more than the previous year. The departmental working of the dry docks was carried out successfully and economically, the expenditure being practically the same as that for 1926-27 in spite of the increased tonnage handled.

The Ballard Pier berth was used by 167 vessels and 333 postal and passenger trains were run to and from the station, connecting with the incoming and outgoing mail steamers. The additional passenger berth on the Alexandra Dock Harbour Wall accommodated 45 vessels. The temporary hotel accommodation provided at the station for the convenience of ocean-going passengers was made use of by 2,303 adults and 238 children.

The Docks Hamallage (Labour) Department satisfactorily met all demands for labour during the year. The attendance of the labourers continued to be satisfactory and they were not effected by any industrial disputes. The average number of labourers engaged daily was 2,486 and the highest number employed on a single day was 4,405. The total tonnage of goods handled during 1927-28 amounted to 3,980,012 tons, the inclusive labour charges averaging 4.13 annas per ton.

The total tonnage dealt with at the bunders was 1,622,594 tons against 1,525,358 tons during 1926-27, the principal increases being in kerosene oil (in bulk), petrol, dates and coal. There were decreases, however, under grain, seeds, chunam and sand.

On the land estates, the most noticeable feature was the keen demand for godown accommodation at the Cotton Depot, owing to the bumper cotton crop. All the Port Trust godowns vacant at the close of last year were taken up during the year under review and, to supplement the godown accommodation, a number of the railway sheds have since been temporarily rented for storage of cotton. The Trustees have recently sanctioned a substantial reduction of rents at the depot, which will have effect from September, 1928. The reductions in rent sanctioned since the opening of the Depot in 1923 aggregate Rs. 3.80 lakhs per annum, or 23 per cent.

Special attention has recently been given to the development of the new residential estates in the neighbourhood of Apollo Bunder and Colaba, and a number of first-class building sites in this vicinity are now offering on 99-year leases at moderate ground rents varying according to position. The old Colaba Cotton Green, which has a magnificent harbour frontage on the east side and is bounded by Colaba Causeway on the west, has been laid out into 37 building plots, complete with necessary cross-roads and drainage. A noticeable feature is the central public garden, which has been designed on most original and artistic lines and will be maintained by the Port Trust for the benefit of the residents on this Estate.

Further to the South a number of attractive residential sites with sea frontage, remote from the noise and dust of the main thoroughfares, are available in the vicinity of Sassoon Dock Reclamation and Jamshedji Bunder. On the Ballard Estate and in Fort Street four or five good plots for offices, shops and

TABLE A.

	Imports (Tons).			Exports (Tons).			Total (Tons).		
	1926-27.	1927-28.	—	1926-27.	1927-28.	—	1926-27.	1927-28.	—
Docks ...	2,065,000	2,488,000	+423,000	2,003,000	2,598,000	+595,000	4,068,000	5,086,000	+1,018,000
Bunders ...	1,094,000	1,217,000	+123,000	431,000	406,000	—25,000	1,525,000	1,623,000	+98,000
Total ...	3,159,000	3,705,000	+546,000	2,434,000	3,004,000	+570,000	5,593,000	6,709,000	+1,116,000

flats still remain to be leased. The recent opening of the new Perozshah Mehta Road provides a direct thoroughfare between the Ballard Pier and Hornby Road and brings the Ballard Estate within half a mile of the centre of the city.

North of the docks, in the area between the harbour and Frere Road, and on the Bunders adjoining the Mazagon-Sewri Reclamation there are ample sites available for storage and general trade purposes. A brisk demand for accommodation has sprung up at the grain depot since the Trustees decided to admit other trades to this area. An important event in the industrial development of this depot is the new project of the General Motors Corporation, who have recently been granted a lease of nearly 38,000 square yards of covered and plinth accommodation which is being rapidly converted to the Corporation's requirements. Here it is intended to fabricate, assemble and test motor cars and trucks of the various manufacturing organisations controlled by this vast Corporation. This project will give employment to many hundreds of skilled workmen and will inaugurate a new epoch in the motor industry of India. Still further North, on the Wadala Reclamation, an area of 45,446 square yards of land was leased during the year to the Standard Oil Company of New York for a bulk petrol installation, a new branch of this Company's business.

The foreign inward and outward traffic on the Port Trust Railway aggregated 506 lakhs of maunds against 424 lakhs during 1926-27, the principal increases being in cotton, seeds, oil-cakes and manganese ore. An increase of 13,239 wagon-loads has also to be recorded in local traffic, principally under seeds, charcoal, manganese ore and oil-cakes. The bulk of the cotton for export continued to be conveyed from the depot to the docks by carts and lorries in spite of concessions in railway rates and handling charges offered by the Port Trust. The Trustees have recently offered further concessions to exporters in the shape of an inclusive 4-bale rate based on the lowest carting charge, and including collection, transport to station, loading into wagons, railing to docks and placing alongside the steamer. The question of the rate of terminals to be paid to the Bombay Port Trust Railway by the G.I.P and B.B. & C.I. Railways, which have been under consideration by the Railway Board and Government for several years, has been satisfactorily settled by an agreement under which the Port Trust Railway will be paid 6 pies per maund for traffic up to 50 million maunds with a decreasing telescopic rate for traffic in excess of this figure. The freight earnings collected during the year on traffic booked or received on account of the G.I.P. and B.B. & C.I. Railways amounted to Rs. 3,14,25,000. The railway carried 44 per cent. of the total railbourne traffic in and out of Bombay. The ratio of working expenditure (Rs. 17.03 lakhs) to receipts (Rs.26.48 lakhs) was the lowest on record. Expenditure in this Department has been retrenched by Rs. 10.43 lakhs or 38 per cent. since 1922-23.

In pursuance of the declared policy of the Board to avoid further commitments on loan account until trade conditions are more settled, capital expenditure during the year under review was kept down to an absolute minimum; it amounted to Rs. 11.86 lakhs, which is the lowest since 1902-03. A sum of Rs. 5.57 lakhs was expended on the deepening of the Alexandra Dock entrance channel and mail steamer berth, Rs. 1.51 lakhs on new dredging plant, and Rs. 1.13 lakhs on removal of a portion of the Alexandra Dock dam. No new loan was raised by the Trustees during the year, the expenditure being financed from loan balances in hand.

The Bombay Port Trust Act was amended during the year to empower the Trustees to institute "Employees' Welfare funds" for the benefit of their employees of all grades. Plans and estimates have been sanctioned for the construction of an Infant Welfare and Maternity block at the Wadi Bundar chawls for dock labourers.

The top floor of Thackersey House, on Ballard Estate, was converted into an Institute comprising billiard room, reading room, card room, etc., for the use of members of the B.P.T. Sports Club. The expenditure amounted to Rs. 9,968.

REVENUE (Details).

The year's revenue, excluding special receipts, compares with that of previous years as detailed in Table B below.

Compared with the last five years the result of the working of the past year is given in Table C below.

The surplus for the year under report amounting to Rs. 6,59,517 has been appropriated to the Revenue Reserve Fund, which will thereafter stand as follows:—

Total as per Administration Report, 1926-27 ...	Rs. 67,42,149
Add—Revenue surplus, 1927-28	Rs. 6,59,517
	Rs. 74,01,666
Deduct—Amount transferred to the securities Depreciation Fund, 1927-28 ...	Rs. 1,23,878
*Total ...	Rs. 72,77,788

*Invested in public securities of the par value of Rs. 65,19,700	Rs. 64,65,167
Cash balance	Rs. 8,12,621
Total ...	Rs. 72,77,788

Taking the securities at their market value and adding the amount set aside in the Securities Depreciation Fund against depreciation of Revenue Reserve Fund securities, the actual value of the Revenue Reserve as at 1st April, 1928, amounts to about 67¼ lakhs of rupees.

Wharfage fees on merchandise at the docks and bunders amounted to Rs. 84,46,651, an increase of Rs. 5,87,355 as compared with the corresponding figure for 1926-27. Transhipment fees on cargo amounted to Rs. 1,75,189, an increase of Rs. 7,006 as compared with the fees for the year 1926-27.

The following figures show the comparison of import and export wharfage exclusive of surtax for the last three years:—

Year.	Import Wharfage.	Export Wharfage.	Total.
	Rs.	Rs.	Rs.
1925-26 ...	49,51,751	32,83,685	82,35,436
1926-27 ...	51,58,968	27,00,328	78,59,296
1927-28 ...	56,21,842	28,24,809	84,46,651

The revenue from the bunders shows an increase of Rs. 5 lakhs as compared with the preceding year. Of this increase, Rs. 3.11 lakhs occurs under wharfage fees, due principally to the enhanced importations of petrol and kerosene oil.

The receipts from dock dues on vessels amounted to Rs. 5,60,369, an increase of Rs. 35,674 as compared with the year 1926-27.

Ground and shed rent receipts at the docks aggregated Rs. 5,16,373, a decrease of Rs. 1,19,596, as compared with the year 1926-27. The decrease is due to quicker clearances of cargoes from the transit sheds.

The receipts from cranage fees at the docks amounted to Rs. 5,72,134 against Rs. 5,07,528 in 1926-27.

There was a slight increase in the earnings of the floating crane "Sarus," which amounted to Rs. 59,221 against Rs. 54,035 in 1926-27. The number of packages lifted during the year was 582. The heaviest single lift made by the crane was a dredger weighing 60 tons.

The receipts under Land Estates aggregated Rs. 48,34,806, a decrease of Rs. 83,237 as compared with the previous year, 1926-27. Ground rent receipts amounted to Rs. 27,25,886, a decrease of Rs. 1,62,855 as compared with the previous year. The decrease is due to a smaller demand for monthly tenancies, seasonal and casual occupations. The following figures afford a comparison:—

	Rents realised.		
	From leaseholds.	From monthly tenancies.	Total.
	Rs.	Rs.	Rs.
1923-24	15,44,361	15,27,450	30,71,811
1924-25	15,76,083	12,94,011	28,70,094
1925-26	16,15,680	11,96,781	28,12,461
1926-27	16,42,193	12,46,548	28,88,741
1927-28	16,98,896	10,26,990	27,25,886

The total area of land let on leasehold at the end of the year was 1,466,780 sq. yds. against 1,396,644 sq. yds. at the close of 1926-27. The number of leases existing on Port Trust Estates on 31st March, 1928, for which bills are rendered was 555 against 549 on the 31st March, 1927.

TABLE B.

Average of three years ending 1921-22			Rs. 2,12,35,237
Do. do. 1924-25			,, 2,64,70,382
During the year 1925-26	Rs. 2,84,13,548	Average	,, 2,76,41,156
Do. 1926-27	,, 2,64,02,353		
Do. 1927-28	,, 2,81,07,566		

TABLE C.

	Income.			Expenditure.		Surplus.	Deficit.
	Revenue Proper.	Surtax.	Special Receipts.	Expenditure Proper.	Special Expenditure.		
	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
1922-23...	2,09,96,302	49,66,049	8,71,019	2,57,74,652	8,26,502	2,32,216	—
1923-24...	2,14,27,766	46,44,046	9,26,766	2,51,90,886	9,36,012	—	1,27,820
1924-25...	2,26,01,556	47,75,428	9,48,694	2,73,20,809	9,65,025	39,844	—
1925-26...	2,36,53,748	47,59,801	9,53,590	2,76,53,225	10,03,623	7,10,291	—
1926-27...	2,19,90,516	44,11,836	11,56,821	2,75,07,995	11,98,260	—	11,47,082
1927-28...	2,34,52,954	46,54,612	12,97,402	2,73,54,098	13,91,353	6,59,517	—

The revenue from the Merewether and Hughes Dry Docks amounted to Rs. 3,25,166 as against Rs. 3,30,459 in the previous year. The gross tonnage dealt with was 696,415 tons against 625,803 tons in 1926-27. The expenditure on working the dry docks was Rs. 2,31,137 as against Rs. 2,29,125 in the previous year. The proportion of working expenses to receipts during 1927-28 was practically the same as last year and it compares favourably with the ratio of expenditure prior to the introduction of the departmental working of the dry docks.

The receipts of the railway during the year amounted to Rs. 26,47,994 as against Rs. 23,10,984 in the previous year. Terminal charges were paid during the year by the two railways at 6 pies per maund, the rate now agreed upon for traffic up to 50 million maunds in a year.

The receipts under this section amounted to Rs. 14,03,044 as against Rs. 13,35,208 in the preceding year. The increase is due to higher receipts under hire of salvage plant, including diving operations and to the interest on the investments of the Fire, Marine and Motor Insurance Fund being credited to this section, as the fund has reached the sanctioned limit of Rs. 10 lakhs.

The revenue of the Port Department amounted to Rs. 5,80,005, an increase of Rs. 46,947 over the previous year.

The pilotage receipts, including interest on investments of the Vessels Replacement Fund, totalled Rs. 5,40,969 against Rs. 4,93,095 in 1926-27. Pilotage, transporting and pilots' attendance fees realised Rs. 3,85,201 against Rs. 3,50,303 in the previous year. The receipts from surtax amounted to Rs. 95,749. The pilotage account closed with a surplus of Rs. 93,050 which has been transferred to the Vessels Replacement Fund.

REVENUE EXPENDITURE (Details).

The total expenditure charged to revenue under the several heads of accounts is compared with the actuals of 1926-27 and the revised budget estimates for 1927-28 in Table D below.

The total expenditure under General Account, Port Department and Pilotage Account aggregated Rs. 2,73,54,098, a decrease of Rs. 1,53,897 as compared with the previous year. Of this decrease Rs. 66,642 occurs under debt charges and is due to the reduction granted by the Government of India in the rate of interest from 6½ per cent. to 4¾ per cent. on the loan of Rs. 54½ lakhs borrowed in 1921-22. It is hoped to obtain similar reductions on the other loans borrowed by the trustees from Government as soon as the latter replace their loans originally raised at high rates (from which the money was loaned to the trustees), by other loans at a reduced rate of interest. The trustees are also endeavouring to effect further reductions in their debt charges by repaying the Pir Pau loan of Rs. 17 lakhs borrowed from Government in 1919 from surpluses in their Sinking Fund investment accounts and by re-issuing at a lower rate of interest two loans which fall due for repayment in 1929-30 and which have to be renewed for a further term in accordance with the Sinking Fund arrangements.

Exclusive of debt charges, the ratio of working expenses to receipts compares favourably with previous figures. The statement in Table E below shows the percentage of working expenses to receipts during the last 5 years.

The reduction under staff expenditure in 1927-28 as compared with the year 1922-23, when the special retrenchment campaign was first started, amounts to Rs. 11 lakhs after taking into account the cost of the increments to employees on graded pay.

DEBT.

To avoid any increase in debt charges, the trustees curtailed their capital programme by postponing all works not immediately essential. No new loan was therefore necessary during the year under report.

The total debt of the Board at the close of the year amounted to Rs. 22,42,11,714, of which Rs. 7,61,46,038 was due to Government and Rs. 14,80,65,676 was on account of the Foreshore Securities and Debenture Loans due to the public.

The total expenditure on Capital Account since the constitution of the Trust amounts to Rs. 23,59,44,086 from which Rs. 11,73,994 (being receipts from sale of old plant, etc., paid to Government in reduction of debt to 31st March, 1914), has to be deducted, leaving Rs. 23,47,70,092. The cost of the old lightship "Colaba," the Kennery and Dolphin Lighthouses, and certain other properties originally made over to the trustees by Government free of charge are not included in this amount and it does not take into account the invested funds and unspent balances of loans aggregating Rs. 6,08,01,573, as under:—

	Rs.
General Sinking Fund	3,13,35,029
Victoria Dock Sinking Fund	74,06,541
Revenue Reserve Fund	72,77,788
Depreciation, Emergency, Fire Insurance and other funds for special purposes	88,74,473
Cash being amount of unspent balances of loans	59,07,741
Rs.	6,08,01,573

It will be seen from the above figures that the total expenditure on Capital Account is Rs. 23.48 crores whereas the outstanding debt is Rs. 22.42 crores. Of the latter a sum of Rs. 59 lakhs represents unspent capital balances in hand on 31st March, 1928, so that against an expenditure of Rs. 23.48 crores, the trustees have a debt of Rs. 21.83 crores. The difference of Rs. 165 lakhs is accounted for as follows:—

Rs. 49 lakhs being debt repaid to Government by annual equated payments. Rs. 116 lakhs being appropriations from Revenue to Capital. Total—Rs. 165 lakhs.

The principal items in the details of the appropriations to Capital is the sum of Rs. 47 lakhs transferred from the Revenue

TABLE D.

—	Actuals, 1926-27.	Revised Budget, 1927-28.	Actuals, 1927-28.	Actuals, 1927-28, in comparison with.			
				Actuals, 1926-27.		Revised Budget, 1927-28.	
				More.	Less.	More.	Less.
	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
Section I.—General Charges	24,78,026	25,42,153	25,15,532	37,506	—	—	26,621
,, II.—Bunders and Land	19,26,978	16,52,737	14,65,529	—	4,61,449	—	1,87,208
,, III.—Railway Department... ...	17,26,436	16,89,173	17,03,157	—	23,279	13,984	—
,, IV.—Wet Docks	67,00,108	71,10,790	70,51,835	3,51,727	—	—	58,955
,, V.—Dry Docks	2,29,125	2,42,518	2,31,137	2,012	—	—	11,381
,, VI.—Rents	1,34,523	1,34,526	1,34,524	1	—	—	2
,, VII.—Debt Charges	1,32,07,224	1,31,40,686	1,31,40,582	—	66,642	—	104
,, VIII.—Special Repairs and Renewals	2,54,000	2,54,000	2,54,000	—	—	—	—
,, IX.—Port Department	4,25,311	4,83,390	4,37,328	12,017	—	—	46,062
Total Expenditure (General and Port Department)	2,70,81,731	2,72,49,973	3,69,33,624	4,03,263	5,51,370	13,984	3,30,333
Pilotage	4,26,264	4,37,741	4,20,473	—	5,791	—	17,268
Special Expenditure	11,56,821	12,57,000	12,97,402	1,40,581	—	40,402	—
Grand Total	2,86,64,816	2,89,44,714	2,86,51,499	5,43,844	5,57,161	34,386	3,47,601
Net Difference	—	—	—	—	13,317	—	2,93,215

TABLE E.

Year.	Receipts.	Expenditure.			Percentage of Working Expenses excluding Debt Charges to Receipts.
		Debt Charges.	Working Expenses.	Total.	
	Rs.	Rs.	Rs.	Rs.	
1923-24	2,60,71,812	1,17,17,465	1,44,72,922	2,61,90,387	55.51 per cent.
1924-25	2,73,76,984	1,25,65,503	1,47,55,306	2,73,20,809	53.90 per cent.
1925-26	2,84,13,548	1 32,11,057	1,44,42,168	2,76,53,225	50.83 per cent.
1926-27	2,64,02,353	1,32,07,224	1,43,00,771	2,75,07,995	54.16 per cent.
1927-28	2,81,07,566	1,31,40,582	1,42,13,516	2,73,54,098	50.57 per cent.

Reserve Fund to Capital during 1916-21 for expenditure on works as an alternative to borrowing at high rates during this period.

TRADE AND TRAFFIC STATISTICS.

The value of the trade of the port as shown in the Customs returns, inclusive of Government transactions, was Rs. 251 crores as compared with Rs. 245 crores in the previous year, an increase of about 2.5 per cent.

The traffic at the warehouses during 1927-28 compared with that of the two previous years is given in Table F below.

The stock of piecegoods and yarn on 31st March, 1928, was 49,000 packages as against 36,000 packages on 31st March, 1927.

The traffic at the docks bonded warehouses is given in Table G below.

The balances of piecegoods, twist and yarn at the docks bonded warehouses on 31st March, 1928, was 5,768 packages as against 3,710 packages on 31st March, 1927.

As there was a wide disparity in the rates for certain classes of goods stored in the bonded and duty paid warehouses respectively and as there appeared to be no justification for the levy of a differential tariff, the bonded warehouse schedule of rates was adjusted to bring it to a parity with the duty paid schedule. A common schedule of charges for both sets of warehouses was adopted and brought into force from 1st April, 1928. Opportunity was also taken to enlarge the classification in both cases to conform to the classification for the levy of dock wharfage charges.

The receipts and deliveries at this warehouse during 1927-28 compared with those of the two previous years are given in Table H below.

The sales of uncleared cargoes landed at the docks and bunders during the year realised Rs. 19,230 as against Rs. 35,926 in 1926-27.

Of the vessels which entered the docks 82 were over 470-ft. in length and 36 between 450 and 470-ft., as against 67 and 40 respectively, in 1926-27. Of the vessels over 470-ft. in length, 31 were over 500-ft. long and 20 between 490 and 500-ft.

The largest vessel that entered the port was the ss. "Belgenland," length 670-ft., beam 78-ft., and gross tonnage 27,132 tons. This vessel also left the port with the deepest draft, i.e., 32-ft. 8-in.

Twenty-four vessels discharged liquid fuel at Nos. 18 and 19 berths, Alexandra Dock Harbour Wall and K Berth, Prince's Dock, during the year. The number of oil-burning vessels excluding tankers entering the port during 1927-28 was 166.

Sixteen vessels were detained in the stream for periods varying from 1 day to 3½ days awaiting accommodation in the docks. In the case of 15 vessels the detention was for 2 days or less and 1 vessel was detained for 3½ days.

The figures in Table I below show the occupation of the dry docks.

The inner section of the Hughes Dry Dock was closed from the 24th February, 1927, to 14th August, 1927, in connection with the work of strengthening the caisson stops.

The largest vessel dry-docked during the year was the ss. "Ranchi" in the Hughes Dry Dock, 16,650 gross tonnage, 547-ft. long, 71-ft. beam.

MISCELLANEOUS.

In pursuance of the general policy of retrenchment, the trustees' inspection of Port Trust works was not held during the year under report.

STORES DEPARTMENT.

There was a further reduction in the prices of several commodities and contracts were entered into in the case of all articles in constant demand. The quantity of stores purchased through the medium of casual tenders was consequently very small. Supplies of first-class coal from Bengal were obtained through Messrs. Grahams Trading Co., Ltd., who secured the contract by open tender. Supplies of second-class Bengal coal for use on the Port Trust Railway were contracted for with Messrs. Madhavlal and Co., Ltd.

The cost of the stores purchased by the Controller of Stores and the Chief Engineer during the year are given in Table J below.

BUNDERS AND LAND DEPARTMENT.

The old cotton godowns in the vicinity of the Sassoon Dock are now fully occupied, mainly by the motor trade as repair workshops.

The Asiatic Petroleum Company have during the year completed their buildings on the additional land taken on lease at Wari Bunder for storage of lubricating oils.

The rail-borne charcoal occupations showed some improvement, an area of 21,059 square yards being taken up by the trade. The trustees have allotted a site for a rest shed at a nominal rent. The rail-borne coal traffic, on the other hand, fell off very considerably in consequence of the reduction in sea freights.

TABLE F.

		1925-26.		1926-27.		1927-28.	
		Receipts.	Deliveries.	Receipts.	Deliveries.	Receipts.	Deliveries.
PACKAGE GOODS—							
Piece-goods and Yarn	Packages	133,258	141,546	130,008	130,739	172,703	159,046
Miscellaneous Goods	,,	155,731	168,928	150,053	148,254	112,779	122,380
	Total	288,989	310,474	280,061	278,993	285,482	281,426
WEIGHT GOODS—							
Miscellaneous	Tons	8,723	9,427	10,139	10,493	9,050	9,563
Metal	,,	7,905	8,219	7,471	7,344	4,202	4,903
	Total	16,628	17,646	17,610	17,837	13,252	14,466

TABLE G.

		1925-26.		1926-27.		1927-28.	
		Receipts.	Deliveries.	Receipts.	Deliveries.	Receipts	Deliveries.
PACKAGE GOODS—							
Piece-goods and Yarn	Packages	37,064	33,236	20,068	25,254	33,746	31,796
Miscellaneous	,,	13,272	14,955	24,316	20,946	20,895	22,212
WEIGHT GOODS—							
Miscellaneous	Tons	24,952	25,581	44,432	24,832	56,950	66,841

TABLE H.

	1925-26.		1926-27.		1927-28.	
	Receipts.	Deliveries.	Receipts.	Deliveries.	Receipts.	Deliveries.
Packages	8,515	8,578	6,774	6,713	7,584	7,406

TABLE I.

		1926-27. Days.		1927-28. Days.
Merewether Dry Dock		261½		219½
Hughes Dry Dock	Inner Section 114½	143	90	192½
	Outer Section 28½		85½	
	Whole length ... ... —		17	

TABLE J.

		Indigenous.	Foreign. Purchased in India.	Foreign. Purchased through London Agents.
By the Controller of Stores	Rs.	10,14,000*	Rs. 5,30,000	Rs. 67,000
By the Chief Engineer	,,	2,03,000	,, 63,000	,, 2,17,000
	Total Rs.	12,17,000	Rs. 5,93,000	Rs. 2,84,000

*Coal ... ... Rs. 4,44,000
Miscellaneous... ... ... Rs. 5,70,000

The trustees sanctioned the allotment of a large recreation field on the reclamation at a nominal rent for the use of the boys training on the I.M.M.T.S. " Dufferin." The work of levelling up and enclosing the area and the construction of a pavilion was carried out by the Port Trust at the cost of the Government.

An extended use was made of the oil pier during the year under report. Thirty-six vessels discharged petrol and kerosene oil as compared with 30 vessels in the previous year. The quantities discharged were as under:—

	1925-26.	1926-27.	1927-28.
Petrol, Gallons ...	7,443,903	10,017,162	12,955,826
Kerosene, Gallons	30,494,648	26,531,307	34,926,328
Total ...	37,938,551	36,548,469	47,882,154

There were 17 fires on the trustees' land estate as compared with 9 in 1926-27. Ten occurred at the cotton depot, of which three were serious and involved losses aggregating about Rs. 19 lakhs. It is however satisfactory to note that the sprinkler equipment of the godowns has so far proved effective and no serious fire has occurred in the godowns since the depot was opened. The trustees have submitted proposals for consideration by the East India Cotton Association and the Fire Insurance Association for improving the patrol and supervision arrangements at the depot in order to minimise the risk of fire in future.

The Town Duty collected on behalf of the Municipality at the docks and bunders during the year under report amounted to Rs. 26,93,773, as compared with Rs. 28,81,599 in the preceding year 1926-27.

RAILWAY DEPARTMENT.

There was an improvement in traffic on the Port Trust Railway as compared with last year, both in foreign and local traffic. The number of wagons received and despatched during the last two years compares as follows:—

	Inward.		Outward.	
	1926-27.	1927-28.	1926-27.	1927-28.
Foreign	68,587	81,407	49,495	54,928
Local	30,069	41,134	30,766	41,862
Total ...	98,656	122,541	80,261	96,790

During the year 50 troop and other special trains were run over the railway and 333 postal and passenger expresses were run to and from the Ballard Pier station as against 281 in the previous year.

The supply of foreign wagons was satisfactory, but there were occasional delays in obtaining special types of wagons. In certain cases, the supply of wagons for traffic to stations on the G. I. P. and B. B. & C. I. Railways situated near Bombay was supplemented by the use of B. P. T. wagons under special arrangements.

The Wadala School maintained its good record in regard to the number of pupils, attendance and examination results. The branch school at Antop Village completed its second year with very satisfactory results. The expenditure on the schools, including cost of annual prizes, amounted to Rs. 5,920.

Merchandise railed direct into the docks amounted to 658,063 tons, an increase of 178,077 tons as compared with the previous year. The principal increases were in seeds, 49,540 tons; cotton seed, 76,043 tons; oil cakes, 21,349 tons, and manganese ore 58,914 tons. Out of the total quantity of 281,018 tons manganese ore railed into dock for shipment, 27,500 tons were booked for shipment at non-rail served berths and were transported by Port Trust agency free of cost to shippers from railhead to alongside the vessels. During the year 206,153 bales of cotton were railed down from cotton depot against 277,874 bales in the preceding year.

Thirty-three accident cases were reported to Government during the year under the provisions of the Indian Railways Act. Twenty-four of these involved injuries, one person being killed. In no case was the railway held to blame.

PRINCE'S, VICTORIA AND ALEXANDRA DOCKS.

There were 10 fires at the docks, wharves and sheds and on board vessels and craft while in the docks. None was serious or involved loss of life.

The number of accidents to persons in the docks was 592 of which 20 were fatal, 126 serious and 446 slight. Of the fatal cases, 4 were caused by falling into holds or lighters, 9 by falling into dock basins, 1 by goods falling out of slings and 6 were due to other causes.

Three accidents to vessels in the docks occurred during the year, in which Port Trust officials were held to blame.

The return furnished by the Commissioner of Police of cognizable crime in the docks for the calendar year 1927, gives the following particulars which are compared with the corresponding returns of the two previous years:—

	1925.	1926.	1927.
Persons Arrested	6,927	8,404	14,365
Number Convicted	6,764	8,301	14,143
Percentage of Convictions ...	97.6	98.8	98.5
Number of Cases of Theft ...	244	245	239
Number of Cases in which Property was Recovered	209	201	217
Amount of Property Stolen ...	15,909	18,326	10,669
Amount of Property Recovered ...	4,463	13,960	4,053
Percentage of Value of Property Recovered	28.05	76.18	37.99

Under the police retrenchment scheme, the strength of the dock police was divided into the categories of " Law and Order " and " Watch and Ward." The cost of the former is shared by Government and the trustees in equal proportions, whilst the entire cost of the latter is now borne by the Port Trust. This arrangement was sanctioned from 1st October, 1927, and is subject to re-examination after a period of two years.

Proposals are now under consideration for revising the Harbour Police arrangements which will entail the patrol duties in connection with obstruction of channels, etc., being taken over by the Port Trust.

The following reductions and concessions in the Docks and Bunders Scales of Rates were sanctioned during the year:—

DOCKS SCALE OF RATES.

(a) A special rate of 2 annas per package was provided for kapok or sawree cotton imported in bags or bundles of 1 cwt. and under.

(b) The charge for loading of heavy lifts into railway wagons by means of the floating crane " Sarus," was reduced to half the scale of ordinary charges; and, as the rates for similar lifts by the 30 and 100-ton cranes were very low, they were revised so as to provide for the levy of half the ordinary rates.

(c) The recovery of out-of-pocket expenses only was sanctioned when a dock shed is required to be kept open at night or on Sundays or holidays for the purpose of ventilation on account of perishable cargoes stored therein.

(d) A new concessional rate of wharfage charge of Re. 1 per ton was introduced for china-clay imported in bulk and discharged direct into open wagons for conveyance to the bonded warehouse at grain depot. This represented a reduction of 50 per cent. on the cask rate. Three shiploads of china-clay in bulk amounting to 13,829 tons were imported during the year.

DOCKS AND BUNDERS SCALES OF RATES.

(e) The import wharfage on bulk petrol was reduced by 40 per cent. to 9 pies per gallon with effect from 1st April, 1928, and the export wharfage on liquid fuel for bunkers at the docks was reduced by 50 per cent. to 9 pies per 12 Imperial gallons.

The northern bay of the liquor warehouse, Alexandra Dock, was handed over to the Customs Department from September, 1927, for the examination of dutiable goods entitled to drawback on reshipment. This work was previously carried on in the various transit sheds in Alexandra Dock.

The Docks Manager was given special emergency powers to waive extra fees incurred on consignments intended for rail-borne delivery ex-godowns owing to delay due to closure of stations or break-down in postal communications as the result of the unprecedented floods in Guzerat and Kathiawar in 1927.

In order to facilitate the landing and shipping of unpacked motor cars, the trustees sanctioned the purchase of a lifting carriage complete with teak spars.

The number of pupils on the rolls of the primary vernacular school maintained by the trustees for the education of the children of dock labourers was 111 on 31st March, 1928. The staff consists of four teachers, one of whom is a lady teacher. The school was inspected by the superintendent, municipal schools, and a grant of Rs. 450 was sanctioned by the municipality. The net expenditure on the school was Rs. 1,513.

PORT AND PILOTAGE DEPARTMENT.

During the year 159 day tours and 88 night tours of inspection were made by the special officer in charge of this work. The number of light passes granted was 3,246; 265 lectures were given which were attended by 6,958 tindals and boatmen.

There were six accidents to vessels while in Port Trust pilotage charge during the year, only one of which was serious. On three occasions, the pilot in charge was held to be at fault.

CAPITAL (Expenditure and Works).

The aggregate expenditure on Capital Account during the year was Rs. 11,86,374 apportioned over the various works as follows:—

		Revised Estimates. Rs.	Actuals. Rs.
Section I.	Morewether Dry Dock	400	354
	New Works, Ordinary	3,83,200	3,04,936
,, II.	Alexandra and Hughes Dock Works	10,11,500	8,56,168
,, III.	Port Trust Railway and Depots ...	1,29,400	24,916
		15,24,500	11,86,374

This outlay was met as follows:—

	Rs.
From Loan Balances in hand	11,35,313
,, Sale proceeds of property	51,061
	11,86,374

The new steam launch " Piper," which was built by Messrs. Alcock Ashdown and Co., Ltd., Bombay, at a cost of Rs. 28,804, was put into commission on 2nd July, 1927.

The erection of the two remaining barges (out of the six purchased for the dredger) was completed during the year.

The apparatus and tower were received from England and the installation was completed during the year. The expenditure incurred amounted to Rs. 13,403.

This pier was taken over from Government at a valuation of Rs. 16,020 in connection with an extension of the port limits in Mahul Creek.

A considerable amount of equipment was purchased and installed during the year.

The work of extending the slipway at Clarke Basin by 18-ft. was taken in hand and had made good progress by the end of the year.

The extension of the 8-in. liquid fuel pipe-line to berths Nos. 14 and 15, Alexandra Dock, was completed in May, 1927.

The old wooden storage shed which was in a delapidated condition was replaced by a new open shed constructed of rolled steel columns on cement concrete foundations with a roof of asbestos cement corrugated sheets.

To meet the requirements of the trade and overcome the difficulties experienced by merchants in removing goods from the bunder, a 30-ft. wharf road was constructed during the year at a cost of Rs. 10,561.

One old locomotive, which was surplus to requirements, was sold during the year to Messrs. Burn and Co. for Rs. 17,500.

A new siding at Panton Bunder was opened for traffic from 19th December, 1927.

Three echelon sidings into the Asiatic Petroleum Co.'s lubricating oil installation at Liquid Fuel Depot were laid down in May, 1927.

The expenditure on these docks during the year amounted to Rs. 8,56,168, making a total of Rs. 6,16,06,253 since the commencement of the work in 1904. The following are the principal details of the expenditure during 1927-28:—

	Rs.
Deepening Entrance Channel	3,95,161
Deepening Mail Steamer Berth at Ballard Pier ...	1,62,056
Removal of Dams	1,13,077
Paving and Metalling of Wharves	30,255
Office for Deputy-Manager and Cash Department	28,305
Providing Iron Roller Paths for Cranes	21,426
Harbour Wall Development	11,273

The deepening of the entrance channel to 28-ft. below L.O.S.T. was continued throughout the year and the outer portion known as the Approach Channel was completed. Owing to the very hard nature of the rock encountered, the cost of the work has exceeded the sanctioned estimate of Rs. 26½ lakhs, and revised estimates are now under preparation.

The work of deepening the mail berth at Ballard Pier to 32-ft. below mean of L.O.S.T. was almost completed at the end of the year.

The removal of the north end of the Alexandra Dock dam in order to promote a tidal scour along the harbour wall and counteract the great amount of filtration that annually takes place inside the dam, was commenced in October, 1927, and completed in March, 1928.

The wharf at berth No. 3, admeasuring 135 squares, was paved with sett stones on a 6-in. cement concrete bed. The open wharf adjacent to No. 10 berth was recambered and the surface treated with Mexphalt.

The new office to accommodate the deputy manager, Alexandra dock, and the cash department was completed during the year.

About 540 lineal feet of cast-iron crane roller paths were laid down on the granite copings of the dock walls during the year, making a total of 3,500 lineal feet since the commencement of the work, which is still in progress.

In order to minimise the interference caused by oil tankers to passenger vessels and troopships at No. 18 passenger berth, the trustees sanctioned the equipment of an additional berth (No. 20) on the Alexandra Dock Harbour Wall with oil pipe-line connections for the discharge of tankers. This berth was completed and brought into traffic use on the 8th December, 1927.

MAINTENANCE DREDGING.

The total quantity dredged during the year on revenue account was 3,846,325 tons, as against 5,525,060 tons in the previous year, 1926-27. The decrease is due to no dredging being necessary in connection with the oil pier at Pir Pau during 1927-28. The average cost per ton on maintenance dredging was 2.87 annas per ton as compared with 3.18 annas in the preceding year.

BOARD OF TRUSTEES.

During the year under report, 28 general meetings of the Board and 45 meetings of the committees were held.

STAFF.

The total approximate number of staff employed during the year as compared with the two previous years was as under:—

	1927-28.	1926-27.	1925-26.
Permanent—Superior ...	1,954	1,994	1,996
Permanent—Inferior ...	447	451	451
Temporary Staff (including Casual Labour at the Docks)	9,806	10,337	10,886
Total ...	12,207	12,782	13,333

In consequence of the curtailment in the capital programme, no further expenditure was incurred during the year on staff housing.

The average daily attendance at the Trustees' Dispensary at Prince's Dock was 68.04. There were 1,001 cases of injuries and 1,395 sick certificates were granted. At the Wadala Dispensary, the average daily attendance was 13.7; 587 cases of accidents were treated and 208 sick certificates were issued. At the Antop Village Dispensary, the average daily attendance was 31.3; 43 cases of injuries were treated and 451 sick certificates issued. At the Grain Depot Dispensary, the average daily attendance was 20.42 and 1,298 cases of injuries were treated; the number of sick certificates granted was 203. During the year 1927-28, there were 19 deaths among the superior and 5 among the inferior staff.

In the case of the 7 appointments filled by Europeans during the two years, 5 officers were promoted from the existing staff and two had to be engaged from outside as no statutory Indians with the required qualifications, experience and training were available for the posts of a boilermaker foreman at the workshops and a certificated dredging engineer.

The trustees are again pleased to record their appreciation of the good work of their officers and staff in all departments.

Port Dues in Yugoslavia.

Prevailing Rates of Exchange.

The Department of Overseas Trade has received from the Commercial Secretary at Belgrade the following list of the official rates of exchange for the payment of port dues in Yugoslavia during the month of December, which have appeared in the " Official Gazette " of the 27th November:—

	Dinars.
1 Gold Napoleon	219.10
1 Pound Sterling	276.00
1 American Dollar	56.90
1 Canadian Dollar	56.60
1 German Mark (gold)	13.56
1 Austrian Shilling	8.00
1 Belga	7.90
100 French Francs	222.40
100 Dutch Florins	2284.70
100 Italian Lire	297.15
100 Roumanian Leis	34.20
100 Danish Crowns	1517.10
100 Swedish Crowns	1522.00
100 Norwegian Crowns	1517.10
100 Spanish Pesetas	917.20
100 Greek Drachmas	73.65

Personal enquiries regarding shipping and transport matters should be made at the City Office of the Department (Shipping and Transport Section), 73, Basinghall Street, London, E.C.2.

WHARF CONSTRUCTION AT NEW ORLEANS.

At the regular meeting of the New Orleans Dock Board, on Thursday, November 22nd, contracts to the amount of $23,278 on current construction were authorised, and agreement entered into to install for the Cuyamel Fruit Company steel curtains in the rear of Desire Street Shed at a cost of about $12,000.

There were two construction contracts authorised, one with the Gulf States Creosoting Company for 172,000-ft. of creosoted lumber for the St. Andrew's Street Wharf and one with A. P. Boh & Company for woodwork and painting in the second unit of the Poland Street Shed. At St. Andrew's Street approximately $500,000 is being spent in reconstruction and extension work, including concrete deck, roadway and apron; other contracts let, to date, on that job and in course of execution total $203,463. On the second unit at Poland Street, connecting with the army supply base, the Board are spending approximately $400,000, and have authorised previous contracts to the amount of $278,091.

Pneumatic Grain Handling at Ports.

(*Concluded from page 62*).

Air Exhausters.—The air-exhausting plant of a pneumatic elevator must be capable of dealing with a very large volume of air at a low pressure, and for this reason must be fitted with a large number of inlet and outlet valves of small area, or a correspondingly smaller number of valves of large area.

These valves must be of special and careful design otherwise their maintenance will become a very large item of expenditure. Dust gets between the valves and their leather, rubber, or other form of seating, which is rapidly eaten away with a consequent drop in efficiency and frequent stoppage of work that renewals may be effected. This applies also to the cylinders, pistons, and junk rings.

The main difficulty in an exhauster of this type was thought to be the liability of the vanes to cutting, and wear by any dust contained in the air and the large amount of power absorbed when, for any reason, the vacuum fell.

The former fear has not materialised in practice, cutting and wear having been reduced to negligible amounts by special precautions in design.

Messrs. Brown, Boveri and Co., in 1911, appear to have been the first to supply this type of pump for the pneumatic handling of grain, and its performance was in every way satisfactory, since when it has been adopted by various ports for similar work.

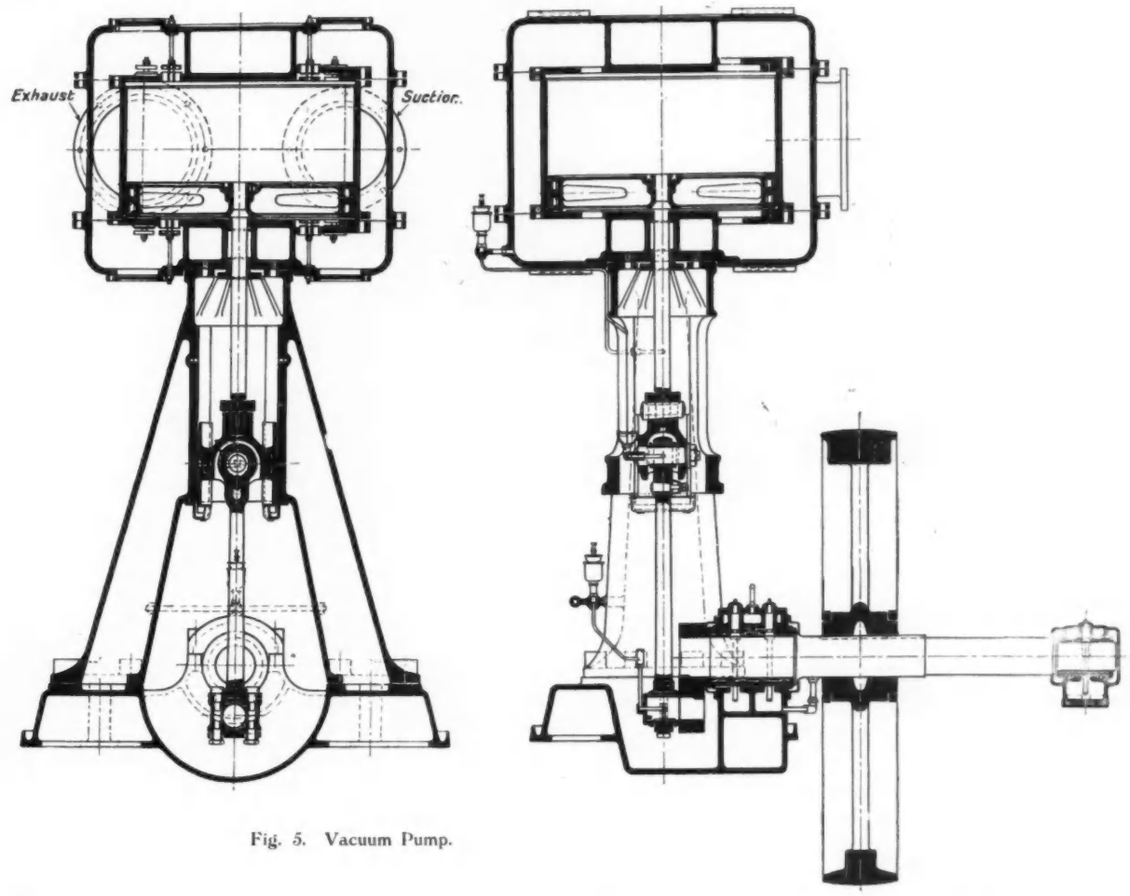


Fig. 5. Vacuum Pump.

A great deal of power is absorbed by the high velocity necessary to pass the air through the inlet and outlet valves and from the pumps, and the speed of the reciprocating pump is necessarily limited owing to the vibration which would be caused by high speed. However, these pumps have now reached a high standard of perfection and efficiency.

Fig. No. 5 illustrates a modern type of vacuum pump designed specially by Messrs. Henry Simon and Co., Ltd., as the air-exhausting unit for pneumatic grain elevating.

The pump is of the vertical type with a large number of valves situated in the top and bottom covers. The valves are composed of single steel discs of special material mounted on spindles with light springs. The pump is designed to give a high efficiency with a low vacuum or small pressure difference of some 7-in. to 12-in. of mercury, and is constructed so as to be unaffected by any dust which is carried over in the air.

The piston is not lubricated in the ordinary way, but to prevent unnecessary friction, the cast iron piston rings carry a special dry graphitic composition which requires little or no attention.

All vertical pumps can be of the single-cylinder or double-cylinder type as required.

Fig. No. 2 shows a pair of single-cylinder pumps, steam driven, constructed by the above-mentioned firm for the War Office and used on several floating elevators for handling oats and other grain at various French ports during the Great War.

A type of air exhauster which has been successfully adopted to the requirements of grain elevating is the turbo-fan pump, or rotary exhauster.

In 1916, an exhauster of this type built by Messrs. Frazer and Chalmers was used by the Port of London Authority on two floating pneumatic elevators, Turbos I. and II. above-mentioned for use in the docks of London and Tilbury.

These two exhausters had given such satisfaction that a few years later the pneumatic intake plant at the Central Granary, Millwall Docks, was converted from steam-driven horizontal reciprocating pumps to electrically operated turbo-exhausters, and it is understood that these are giving equal satisfaction.

The chief measure of their popularity is their unfailing service and lack of heavy expenditure on maintenance.

It is stated that in the case of the first two exhausters mentioned, no maintenance charges were incurred with this portion of the plant during a period of 5 years, and that, due to a large and efficient dust cyclone fitted in conjunction with the plants, no appreciable wear was visible on the rotor impellers.

There is no doubt that these facts are strongly in favour of this type of plant. On the other hand, the power absorbed by this type of exhauster when the vacuum fell, due to the nozzles being out of the grain, was excessive. In the plant mentioned, which is described in the Minutes of the Proceedings of the Institution of Mechanical Engineers, as before-mentioned, it is stated that a Semi-Diesel oil engine of 200 b.h.p. was used to drive the Rateau pattern rotary exhauster while the test results show that never was 133 b.h.p. exceeded when actually working grain, the average being about 122. It would seem obvious, therefore, that these engines are never run at their most economical speed when working grain, but that the extra h.p. is required to provide for the overload caused by the sudden

fall in vacuum when the pipes for any reason are out of the grain.

This condition is now met by overload devices which automatically come into action when the vacuum commences to fall, thus keeping the load on the engine more or less uniformly constant. In the same way, auxiliary air-valves are incorporated in the pipe line to enable the vacuum to be varied for working different classes of grain. By these means, the speed of the oil engine is maintained at its most economical revolutions.

Gears.—With the rotary exhauster driven by steam or oil engine, some efficient type of gearing is necessary to obtain the necessary high speed required by the rotary type of air exhauster.

The usual form of gearing is double helical, with forced lubrication and oil-cooling system, coupled to the exhauster and engine with specially designed flexible couplings. The efficiency of the latter is most important for they must, in addition to forming a flexible coupling to eliminate all stresses and strains due to mal-alignment and vibration of the hull and foundations, but they must form a buffer between the gears and engine, and gears and exhauster, exercising a damping effect on all variations of speed in either the one or the other, thus preventing undue wear on the teeth of the gears and that chattering of the gears which is very detrimental to their life and efficiency.

Nozzles.—As has been seen, it was to Mr. F. E. Duckham to whom was due the " Air Sleeve " or " Nozzle " which facilitated the raising of grain by the then know methods of design and construction of pneumatic plants.

In most existing plants, an auxiliary air inlet or sleeve is used which causes a mixture of air and grain to ascend the pipes, which can be varied according to the material which is being lifted. An auxiliary air inlet is also desirable for keeping the vacuum within certain limits to avoid undue leakage and air pump friction. Fig. No. 6 shows a modern suction nozzle.

The action of a nozzle is as follows:—When a straight nozzle is thrust vertically into the grain, air is drawn through the interstices of the grain immediately in the vicinity of the inlet, and exerts a force upon the grains which follow the air up into the pipe, leaving a partial cavity around the nozzle. Grain falls into this cavity most freely from above and descends thereto vertically around the sides of the nozzle, at the lower edge of which the direction is suddenly reversed and the grain is drawn into the pipe.

From this it follows that one of the factors which limits the quantity of grain which can be raised by a pneumatic plant is the rate at which the grain can be drawn through the nozzle.

In the case of a nozzle buried horizontally, the grain falls more easily from above under the action of the flow of air, the " stream lines " having much less curvature, requiring therefore less velocity of air to effect their movement into the pipe. On the other hand, the grain lying below the nozzle is somewhat retarded by the pipe itself. Therefore the nozzle shown in the figure is largely used, and is probably the most efficient form yet evolved in a commercial form.

Actually there is a considerable amount of research and experiment needed in this direction before the nozzle can be accepted as a perfect unit.

There is considerable difference of opinion as to the efficacy of the extra air inlet, and it is stated that when the exhauster plant, and vacuum and pipes are suitably designed and co-ordinated, no auxiliary air inlet is needed upon the nozzle.

One thing is certain, the nozzle does not appear to be the best possible place in practice for a device of this sort, influencing as it does so important a factor as the output of the plant, unless it can be locked in any desired position and controlled by the engineer driver of the plant. The labour handling the pipes in the hold of a vessel are quite unskilled in these matters; moreover, there is the liability to damage owing to the rough treatment such things are called upon to sustain in such hands.

That some method of varying the vacuum or velocity of the air is necessary for dealing with grain of different weights and density appears equally certain, for in practice choking of the pipes occurs unless this is regulated within certain limits.

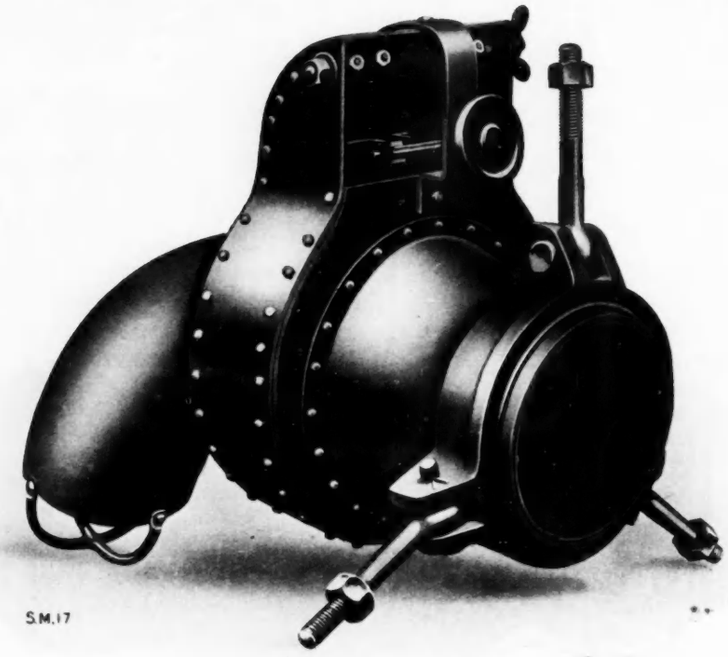


Fig. 6. Suction Nozzle.

PIPES AND PIPE BOOMS.

The pipes conveying the grain and air need little remark. They are made of steel with specially made heavier gauge bends and angles with renewal baffles or sleeves where considerable attrition is to be expected due to movement of the grain.

The lower end of the pipe line is usually of flexible construction to enable the nozzles to be readily moved about in the grain.

The next few lengths of pipe hanging vertically are made in short lengths or telescopic to enable the pipe line to be lengthened or shortened. Several lengths of flexible pipe should also be included in the equipment to enable the nozzles to be placed in places difficult of access.

The pipe boom is usually designed to carry the weight of the longest length of pipes it is calculated would be required for working the largest ship, without recourse to the ship's gear.

The boom should handle the pipes into and out of the hold easily and quickly, and lengths should be capable of addition or removal in like manner.

AIR " LOCKS " OR SEALS.

It was again to Mr. F. E. Duckham, as previously pointed out, that the Tipper Seal was due.

There are two forms of seal in general use, viz.:—

(a) The Rotary Seal.

(b) The Tipper Seal.

A practical difficulty which occurs in each type of seal is the stoppage and often the breaking of the seal mechanism due to pieces of wood and other foreign substances which have been drawn up the pipes. In the former type this eventuality is overcome by means of a friction clutch which slips and allows the seal to cease rotating when an obstruction is met with.

Fig. No. 7 shows a modern type of mechanically-operated Tipper Seal, which is a modification of the original automatic discharge invented by Mr. F. E. Duckham. The Tipper, whether automatic or mechanical, should be readily accessible for repairs or for removal for adjustment. All working services should have renewable faces.

A " tell-tale " should be so arranged as to give indication in the engine room as to the continued working of the Tipper Seal.

Grain Canister or Receiver.—The "Canister" is the receiving chamber wherein the grain raised from the ship's hold is first deposited. Care should be taken in its design to make it impossible for grain to be carried over to the main power plant due to failure of the grain discharger or "tipper," slowness in weighing or other cause.

"Cyclones" or Dust Extractors.—Efficient dust extractors are an essential feature of pneumatic plants in order to prevent as much dust as possible from reaching the exhauster whether the latter is of the rotary turbo type or direct acting pump.

The most usual form of extractor used in plants dealing with cereals is that termed the "Cyclone," which consists of a metal cylinder to which the air outlet pipe is attached centrally at the top, the air inlet being at the side of the cylinder at the upper part in such a way that the air in passing has a "cyclonic" motion whereby the dust is led into an inverted conical receptacle from which it, and any light grains, is mechanically extracted by means of worm gearing, and either fed into sacks or returned to the grain in the canister.

All grain, or the great bulk of it, has to be weighed alongside the ship. One ton weighers are not much used in London, the system being to mostly weigh by 4 bushel and 250 lb. machines.

It is evident, therefore, that where such, or similar, conditions obtain, the whole problem must be very carefully thought out.

As has been pointed out, the factor limiting the output of the elevator is the rate at which the grain can be weighed out and "bagged," and for conditions such as above enumerated with, say, 8 No. 250 lb. weighing machines, an average output of about 75 tons per hour, with a maximum of 100, would probably be found sufficient, the elevator being capable of working end on, if necessary, so that two barges could be worked at once.

A central weigh-house would also be necessary with arrangements so that all the scales could be made to deliver on one side if required, and thus increase the output capacity when filling only one barge at a time in bulk.

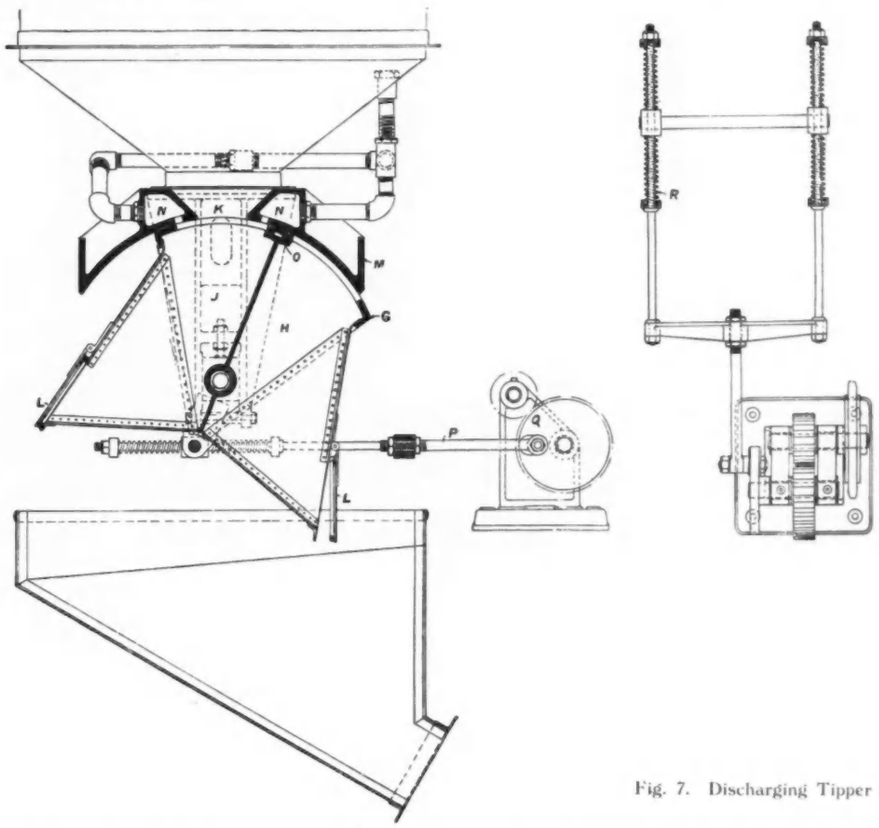


Fig. 7. Discharging Tipper Seal.

The latter procedure is most common, at any rate, in most docks where merchants sell by weight from a sample from the ship, in which case they object to the use of a machine which, although it greatly improves the quality of the grain, deprives them of some weight.

Some means, therefore, have in these cases to be adopted which delivers the grain in the same condition as to dust and dirt as it arrived in the ship.

LOCAL CONDITIONS AFFECTING THE DESIGN OF FLOATING ELEVATORS.

Local conditions as to the size of the docks and lock entrances, as well as the custom of dealing with grain at the various ports very largely influence the general proportions, as well as the design, of floating elevators.

For instance, in Rotterdam, the conditions of discharge are to unload in bulk into barges of almost 4,000 tons capacity, the weighing being executed by 2-ton weighing machines, and any sacking off being done on the quay.

The result is that the hulls of machines for these docks may be as much as 150-ft. by 40-ft. and the output of the machines in the neighbourhood of 250 tons per hour.

Somewhat similar conditions occur at Bristol Docks and the large floating pneumatic plant, illustrated in Fig. No. 1, known as the "Alpha," was installed by the Bristol Docks Committee for use at the Avonmouth Docks for discharging ships at a rate of 200 tons per hour.

The plant is described on page 60 of December issue.

The conditions in the Port of London are very different, and some of the grain here goes direct to merchants' barges, either in bulk or in sacks, some goes away by rail in sacks, some into granaries and silos, and some carted. The majority of grain going to silos and granaries has first to be placed in bulk or sacks in barges, and then re-elevated to the silos or granaries, only in the Millwall Docks at the Dolphin Plant is it placed in bulk direct from the ship into storage.

In a machine for this type of work, it would also be necessary to equip the deck with ample capstan and winch power to enable the merchants' craft alongside being easily and quickly removed, and empty barges rapidly brought into position.

If there is no necessity for drastically limiting the size of the hull, this can be made of such size as to accommodate a larger canister and weigh-house, and more scales. There seems at any rate no reason why the length of the hull should not at least equal that of the barges used in the docks, if the elevator is to be used periodically in the "end-on" position.

Likewise, if the width of the hull is increased, a higher canister can be adopted without endangering stability, thus doing away with the obvious objection of twice elevating the grain, having once raised it to a considerable height by pneumatic power.

PNEUMATIC AND BUCKET ELEVATORS COMPARED.

There are many factors which have a bearing on the relative advantages of pneumatic and bucket elevator plant.

It will be necessary first, however, to enumerate the principal purposes to which the two types of plant can be applied, and to then consider the two types in relation thereto. Fig. No. 4 shows a floating pneumatic elevator, the "Turbo I.", and a bucket elevator, both the property of the Port of London Authority, working the same ship.

Elevators of both types can be used for—

(a) The discharging of barges and lighters;
(b) The discharging of coasting vessels up to, say, 600 tons;
(c) The discharging of ocean-going ships;
(d) Conveying from one place to another.

In cases (a), (b) and (c), the plants can either be floating units, moveable units running on rails on the quay side, or units built permanently as part of the granary, but the comparisons which follow apply in the main to all types.

Considering first the discharge of ocean-going ships, the comparison of the pneumatic and bucket elevator which will usually be of the floating type is as follows:—

(1) **Dimensions of Plant.**—With a pneumatic elevator, the size of ship which can be worked is within reason unlimited, but a bucket elevator must be constructed for working the largest ship it is anticipated will be dealt with, and in the event of the maximum dimensions provided for being exceeded, it becomes difficult, if not impossible, to discharge the ship with the plant provided, whereas with the pneumatic elevator, by a suitable arrangement of flexible portions, the pipe line can enter the hold not necessarily through the deck hatches.

(2) **Discharging "Parcels" of Grain.**—In the case of a pneumatic elevator, it is possible to work any kind of stowage, particularly in connection with the discharge of cargoes consisting of numerous small parcels. Fig. No. 8 shows the stowage plan of an actual cargo. In such cases, the bucket elevator is at an obvious disadvantage as a very large amount of the work of discharging would have to be done by manual labour.

In the cargo illustrated, probably 33 per cent. of it would have required to be "trimmed," as indicated by the cross section lines shown, had only bucket elevators been available. This percentage in some cases rises to 80 per cent.

Other cargoes can be removed from between decks when discharge of grain is by pneumatic plant, which would be difficult, if not impossible, in most cases where bucket elevators are employed, on account of the dust raised and the space taken up by the bucket elevator leg, the passage of the pipes in the case of the phneumatic plant being of little hindrance as they can be introduced through any small opening, or carried inside the vessel any distance so as to deal with the parcels stowed away in awkward corners of the ship.

(3) **Dust in the Hold.**—When certain classes of grain are being discharged by bucket elevators, the dust in the hold is so excessive as to practically incapacitate the men trimming, and they are consequently paid "dirty" money on this account. In all classes and grades, the dust raised is very considerable. With a pneumatic plant, the hold is perfectly free from all dust.

(4) **Rapidity of Shipping and Unshipping Plant.**—In the case of the bucket elevator, it can be rigged ready for work in less time than that taken for getting ready the pneumatic plant, but the latter can be rigged up completely by the time the barges or other craft are moored alongside, and the other necessary preparations have been completed, so the extra rapidity of the bucket elevator is often discounted.

(5) **Work in Bad Weather.**—The advantage lies with the pneumatic plant. Discharging can be continued in all weathers, as the hatches only require to be opened sufficiently to admit the suction pipes, and the grain remains protected against rain and wind both in the hold and in transit.

(6) **Crew and Labour.**—The permanent crews required by each type of machine, from a numerical point of view, are approximately the same, but in the case of the bucket elevator plant, extra labour is required for ploughing gangs in the hold and winch men on the ship's deck, and there are also heavy charges for ropes, plough-boards and other gear. The latter charges are eliminated with the pneumatic plant, and the labour required is limited to two men per nozzle.

(7) **Output.**—The output of both types of machines is governed largely by the conditions of delivery, that is to say whether it is necessary to weigh the grain after it has been abstracted from the hold of the ship. If the grain is weighed, and not "shute loose," the rate of final output depends on the rate of delivery from the scales, rather than the maximum intake capacity of the plant.

As has been seen, the pneumatic machine can deal with "parcels" of grain as effectively as with large quantities of grain in bulk. The former can be discharged almost as fast as a single consignment, the nozzles working as fast in grain 2-ft. or 3-ft. deep as in a full hold. This feature of pneumatic plants is of great importance because it means that the hold is discharged at nearly the maximum rate from start to finish. With a bucket elevator, once the leg has reached the bottom, the output falls off to 30 per cent. or less, and the average rate of output does not exceed 50 per cent. to 60 per cent. of the maximum. In consequence, provision has to be made for dealing with a capacity almost twice as great as the rate at which it is desired to actually discharge a ship. Moreover, since there is a limit to the rate at which the grain can be trimmed, either by hand or by ploughs, there is no commensurate advantage in employing bucket elevators of large capacity, and an output of 80 tons or 90 tons will probably not usually be exceeded.

The output of pneumatic elevators on the other hand can be within reason unlimited, provided there is no restriction due to weighing and/or sacking off. Floating elevators, even in the latter cases, are often of 100-150 tons per hour, while shore plants under similar conditions have been constructed to deliver from 200 to 250 tons per hour.

(8) **Damage to Grain.**—With modern types of pneumatic plant using a low vacuum and properly designed pipes with easy bends giving a clear run for the grain, no damage is caused to grain worked; on the contrary, considerable aeration and cleaning results. There exists a prejudice against discharging malting barley by pneumatic plant owing to the alleged damage to the germ of barley which is especially susceptible to damage, but the writer is unaware of any scientific tests having been carried out to substantiate this prejudice.

It must neither be lost sight of that the bucket elevator is liable to damage the grain by the edges of the buckets being constantly driven into it.

(9) **Reliability.**—The bucket elevator is particularly liable to damage due to obstructions such as pieces of timber and iron and other foreign substances which seem to find their way into grain in bulk.

Such things either will not pass into the nozzle of a pneumatic machine or such as do so, cause no damage or obstruction in the pipes and are effectively dealt with in the tipper, whereas in the bucket type of machine, considerable damage may be done to the buckets and leg long before the obstruction reaches the tipper which, as will be explained later, is so designed as to deal with such contingencies.

Reliability in the power plant of each type will be approximately the same.

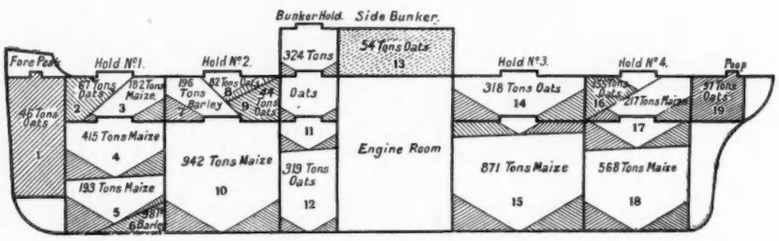


Fig. 8. Stowage Plan of a Grain Ship.

(10) **Capital, Maintenance and Working Costs.**—A pneumatic elevator appears to require approximately five times more power to drive its machinery than a bucket elevator of the same average output, and consequently in ordinary circumstances, the capital cost of the latter is much smaller, but it must not be forgotten that for similar outputs the former type of machine can be built at little extra cost to deal with very large ships, whereas the extra cost involved in building a bucket elevator to deal with such ships would probably raise the cost of the latter plant to that of the pneumatic.

Moreover, to obtain the same average output, as has been seen, the bucket elevator must have a higher maximum output than the pneumatic.

As regards maintenance costs, that is to say charges due to overhauls and repairs of a purely engineering character, the pneumatic machine has again the advantage in practice.

In considering working costs, it is necessary to sub-divide them into engineering costs, and the purely labour charges entailed while discharging grain. The former must again be dissected and considered in the light of wages, fuel and stores. Again the pneumatic machines comprise two classes, those driven by steam, and those whose power is supplied by oil engine.

In a paper read by Mr. R. E. Knight before the Institution of Mechanical Engineers on December 16th, 1921, appears a table of working costs of several types of floating elevators in the Port of London.

Referring to the table, and dealing first with engineering costs—wages—the actual crews and engine room staff charges of steam-driven plants are approximately the same for all types of machines.

The cost of fuel is very much higher in the case of steam-driven pneumatic plants than oil-driven machines, which rank next in order, principally because of the necessity for keeping the boilers in steam under banked fires which not only increases the fuel costs, but necessitates additional wages for night firemen.

Next in order of lowness of cost come steam-driven bucket elevators, and then those electrically-driven and, lastly, a type of bucket elevator with a counter-balanced leg driven by suction gas plant. No figures are available for oil-engined bucket elevators.

Still referring to the table above referred to, it will be noted that to obtain a true comparison of costs, it is necessary to reduce the total output of each machine to a common base.

As regards the extra labour required when discharging grain, as has been pointed out, pneumatic elevators require little or no trimming of the grain to facilitate discharge, while considerable extra labour is required for the bucket elevator, and there are the heavy charges for ploughboards, ropes and such gear.

Turning now to the second and third application, i.e., discharging of small vessels, barges and lighters, it will be obvious that generally the same comparisons hold good to the advantage of the pneumatic plant. It will be necessary, however, to enquire further as to local conditions before arriving at a final conclusion, as to the suitability or otherwise of either type of plant for a particular purpose.

A large dock, capable of accommodating ocean-going vessels will not usually be called upon to discharge small ships of the capacity of 600 tons or so. Mostly all docks, however, use barges and lighters as intermediate carriers of grain which have to be discharged into the granaries and silos ashore, or again they may carry the grain direct to privately-owned mills. The small vessels mentioned will mostly be loaded from ocean-going ships, and used for carrying the grain coastwise to smaller docks or direct to millers' premises. Such vessels generally contain only one parcel of grain of considerable depth and small area, and so diminishing the advantages of the pneumatic elevator discussed under "Discharging 'parcels' of grain."

The pneumatic elevator has here, however, the advantage in many other respects besides those already discussed. The chief are probably where the discharging plant is situated in tidal waters, where the vessels or barges are compelled to take the ground at low water, particularly where owing to the short time the vessels are afloat, it is necessary to place two or more vessels or barges one outside the other.

To work one barge on the barge bed with a fixed bucket elevator will involve a considerable amount of trimming, and when working a second or third, the difficulty will become much greater, if not altogether impossible, owing to the limited reach of a bucket elevator of reasonable and economical dimensions.

In such cases, the stranding of the vessels presents no difficulty at all to the pneumatic elevator with its telescopic pipes and swivelling sockets, and the whole matter resolves itself into one of initial cost. It is probable that the higher average tonnage of the pneumatic plant would justify its adoption, even at the slightly increased first cost.

An attempt to avoid the excessive costs of trimming in barges resulted in the construction of self-trimming barges.

These barges were capable of holding about 250 tons of grain. The bottoms were sloped to a band conveyor running in a closed way along the centre of the barge, to a boot at one end of the barge. The grain was delivered on to the band through openings in the hopper-shaped grain compartment, and the leg of the bucket elevator was placed in the boot.

The cost of such barges is expensive, and involves a large outlay of capital to provide sufficient for working even a small yearly tonnage, and they are not available usually for any other kind of cargo.

It is impossible to keep these barges in good and efficient working order unless they are constantly cleaned.

Grain, grain dust and water find their way into the conveyor tunnels, and much putrifaction, rotting and rust result.

Where the conditions are such that either type of plant could be used with equal facility, the question of suitability will depend solely upon first cost, plus cost of working. In this respect, the pneumatic elevator will be more expensive as regards power, but the cost of maintenance and necessary labour will be less.

It will be obvious that no general comparison as given here is likely to be of actual value for a given case. Each case must be considered on its own particular merits after careful and full consideration of the set of conditions, and the advantages and disadvantages of each type of plant which the writer has endeavoured to summarise and place before the reader.

We now come to (d)—conveying from one place to another.

Some early grain plants on the Continent were constructed with long lengths of horizontal pipe of approximately the same diameter as the vertical pipe. These plants appear to have been unsuccessful until the horizontal portion had been reduced in area.

In a vertical pipe, there is little or no tendency for the grain to rub along the sides of the pipe, but in the case of horizontal pipes, the grain naturally tends to lie upon the bottom of the pipe, and this tendency has to be overcome by means of a small pipe and high velocity; this requires more power than would be necessary for a purely vertical lift.

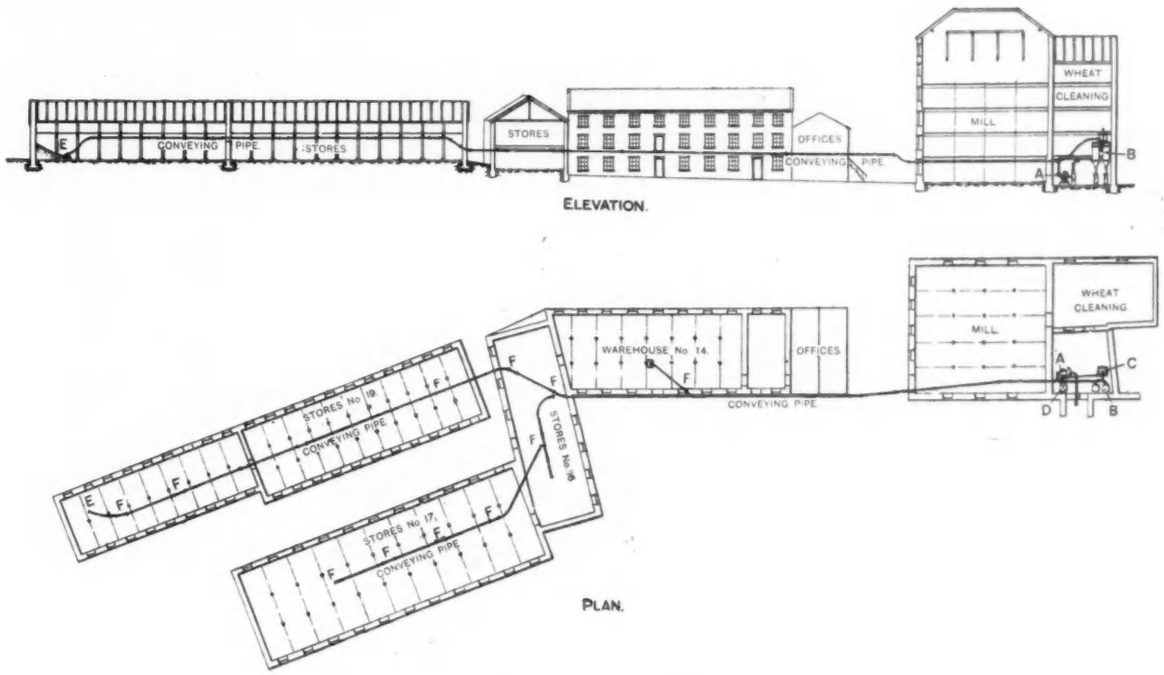


Fig. 9. Pneumatic Conveying Plant.

It is obvious, therefore, that a plant to be used for conveying grain in more or less horizontal pipes, must be very carefully designed. Given such conditions, there is no reason why the plant should not be quite successful and economical.

At the present time, there is little data from experiments available as regards conveying grain in horizontal pipes, but several successful plants involving exceedingly long lengths of horizontal travel have been constructed.

I am indebted to Messrs. Henry Simon, Ltd., of Manchester, for the following description and plan of a plant constructed for Messrs. J. and R. Webb, Ltd., Mallow, in which the longest length of travel is 550-ft.

Fig. No. 9 shows the lay-out of this plant installed for the transport of grain from floor storage to the wheat cleaning department.

By means of this plant, grain is conveyed from any point on the ground floors of the buildings numbered 16, 17 and 19, and also from a bin in building No. 14.

This plant is a good example of the utility of the pneumatic method for dealing with granular materials stored in scattered buildings.

To perform the operations of this plant, band conveyors and elevator feeders would have been most difficult, if not impossible, to arrange efficiently, besides taking up much valuable space which would otherwise be used for storage.

The power absorbed is probably more with the pneumatic system, but the maintenance, upkeep, and labour required with the band conveyors would be very considerable.

There are many situations in which mechanical handling appliances have distinct advantages, e.g., when the runs are

straight and the feeding arrangements are simple, and space can be afforded. On the other hand, there are many cases in which the installation of belt conveyors, spiral worms, and bucket elevators is very difficult, complicated and costly, and it is very probable that the increased cost of the installation of, and working such plants, would be more than met by a saving in initial cost of the installation of a pneumatic system, with its higher-powered power unit.

A Smithfield Occasion.

Mr. F. Hodges on Co-operation. The Lister Example

Mr. Frank Hodges was the guest of honour at the annual dinner given in London by Messrs. R. A. Lister and Co., Ltd., the well-known makers of agricultural machinery of Dursley, Gloucestershire, to their distributors and agents. Over three hundred Lister agents, representing every county in England, Scotland and Wales, as well as representatives of the firm's subsidiary companies overseas were present. Mr. C. Percy Lister presided.

Mr. Frank Hodges (extreme left), Mr. Percy Lister (second from left) and Sir Frank Nelson (extreme right).

Proposing the toast of " British Industry," which he coupled with the name of the Chairman, Mr. Hodges said as a Gloucester man he was particularly glad that Gloucestershire had a firm like Lister's, which not only served the country, but had its ramifications throughout the whole world.

" As you know," said Mr. Hodges, " I have urged from time to time that we have to take big ideas about industry. Neither the orthodox industrial ideas, nor the orthodox political ideas, seem to me to be of any avail now. You have worked out in your particular industry something of which I have dreamt, something for which I have worked in other spheres for many a long year, and I congratulate you, not on having arrived at perfection, but upon having taken a radical step in that direction, based upon the idea that every man in the firm is a man, and that every man, according to the measure of his competence and intelligence, has his responsibility to bear in that firm.

" If British industry were inspired by that commonsense view, because after all it is the commonsense view, that the executive administration is but a part of the whole administration, and that the workmen in their various degrees, and according to their various positions, are equally integral parts in the business, at least the fundamental element of goodwill, which is the principle requisite of industry, would exist, and we should have our feet always on firm foundations."

Mr. Percy Lister, responding to the toast, said that in Dursley the happiest relations existed between them and their employees. They had taken their men into their confidence, and they had responded as they expected them to respond.

" Let us be frank on this subject," said Mr. Lister. " In the past, there have been faults on both sides, sometimes the masters have been wrong and sometimes the men have been wrong. Why cannot we say its been fifty-fifty and make a fresh start? We have the brains and brawn in this country second to none, and we have the money to back them. Let us co-operate and put our houses in order. The producing of goods is one thing, the selling of them is quite another. The first we are going to look after in Dursley, the second depends upon you. By your attendance here to-night you have given us ample encouragement to go ahead with the progressive policy we have adopted at Dursley, where a start has already been made on very extensive enlargements of our factories.

" We want to expand; we mean to expand; and we are going to expand. Not by sitting at home and waiting for business to turn up, but by going out to find it. We ourselves are sending out representatives from Dursley in 1929 to every Continent in the world."

Sir Frank Nelson, M.P., proposing the toast of " The House of Lister," said he had heard Listers eulogised in France, in Germany and in Russia. He had come across their products in Canada, Australia, New Zealand, India, and practically everywhere else in the world. They had in the House of Lister all that was good in trade and industry, all that was sound in administration, and all that was best in the management of one of the greatest businesses England has ever seen.

Mr. A. W. Robins, one of the Employee-Directors of the firm replied.

After dinner, at which the Lister Works Band supplied the music, the party went on to the Winter Garden Theatre, where the whole of the dress circle had been reserved for their use.

North-East Coast Notes.

Two decisions reached recently should have a beneficial effect on the trade of the Tyne. One is the agreement of the trimmers and teamers at the docks and staiths to work later hours on Saturdays, when such working will finish the loading of vessels and enable the steamers to clear the port. The other is the extension of the concession of the London and North-Eastern Railway in regard to transport charges when vessels are diverted from Dunston to Tyne Dock.

When Sir William Noble was re-elected Chairman of the Tyne Improvement Commission on November 20th he was able to speak most hopefully as to the local coal trade. In the ten and a half months of this year, Sir William said, the coal and coke shipments of the river were higher by 200,000 tons than in the corresponding period last year. Coke alone had increased enormously. In 1913 the shipments for the whole year were 273,000 tons, in 1927, 465,000 tons, and in the ten and a half months this year the shipments were 750,000 tons. One of the things that was interfering with the coal trade of the river was that loading stopped at 2 o'clock on Saturdays. The quality of Tyne coal was not in question, but shipowners complained of their vessels being held up over the week-end. Owners were, therefore, boycotting the Tyne on that account and were going to Continental ports.

Ten days after the delivery of this speech a conference was held at the offices of the Tyne Improvement Commission when the question of trimming hours on Saturdays was fully discussed. The meeting was representative of the Tyne, Wear, Blyth, Amble and Seaham Harbour coal shipping interests, including, of course, the staith workers, and resulted in an agreement being reached in principle to work until 10 o'clock on Saturday nights. Certain details as to how that is to be carried out were referred to a small committee.

The extension of the London and North-Eastern Railways Company's rebate scheme, to which reference was made last month, was also welcome news. For several days towards the end of November the congestion at Dunston Staiths, owned by the Railway Company, was very considerable, and it meant that a number of boats were kept idle awaiting an opportunity to get into a berth. When representation as to delay to vessels was made to the London and North-Eastern Railway Company they declined to admit that a case had been made out for the reopening of their West Dunston staiths, but they prepared a new list of collieries—numbering 62—to which the rebate scheme would apply.

PROSPECT OF TYNE DEVELOPMENT.

Sir William Noble, in the course of further remarks at the meeting of the Tyne Improvement Commission (to which reference has already been made) spoke of the scheme prepared by their Engineer (Mr. R. F. Hindmarsh) for further developments. On the south side they had sites even better than on the north. Jarrow Slake had long been a thorny subject, but it was now found practicable to convert the waterway and to fit it with staiths. Plans were being completed for accommodating vessels to a depth of 35 feet at any state of the tide, and there would be appliances for dealing with ore as efficiently as was done on the Continent. This, it was believed, would reduce the cost of the transport of ore by a shilling a ton, which would be a great benefit to the basic industries.

The River Wear Commission have decided to increase their supply of wagons at the Docks by 200, making a total of 500. The cost of the 200 wagons will be £3,400, and the extra siding accommodation and locomotive power which will be required will bring the total cost to £8,000. These developments are rendered necessary owing to the increased traffic at the docks, the trade of which has for some time been showing an upward tendency. The Commission also decided that the high, middle, and lower tiers of buoys should be overhauled at a cost of £1,600.

The North-East Coast has obtained no little share of the shipbuilding orders that have been going round the last few weeks, and amongst those reported placed are the following: Sir James Laing and Son, Sunderland, two cargo vessels for Messrs. Allan, Black and Co., Sunderland. Palmers Shipbuilding and Iron Co., Ltd., a 12,000-ton Diesel vessel for the Blue Star Line (contract said to represent more than £400,000); also an order for two cargo vessels of 9,000 tons each for Messrs. F. Carrick and Co., Newcastle. Messrs. Smiths Dock Co., South Bank-on-Tees, an order for six grain boats for the Canadian lakes, also contracts for seven whaling vessels for Norwegian owners. Messrs. John Redhead and Sons, Ltd., South Shields, orders for three steamers of 9,000 tons each for Messrs. Strick and Co., London. These contracts follow several others which have been placed in the district recently and give hope of more activity in the shipyards in the coming year.

PERSONAL.

For the 26th year in succession, Sir Hugh Bell was elected Chairman of the Tees Conservancy in November last. He referred to the London and North-Eastern Railway Company's two-million scheme for a new dock on the river, and said circumstances had frustrated their efforts to secure further and better dock accommodation and they might before long have to consider if it was their duty to provide such facilities. The Commissioners already were committed to spend over half a million on deepening and widening the river and that money would be virtually wasted unless dock accommodation was improved.

The resignation of Col. J. H. Nicholson, who has been a member of Blyth Harbour Commission for the last fifteen years, was announced at the last meeting of that authority, and the Chairman (Mr. Ridley Warham) expressed the Board's regret at the severance of the connection.

Sir Philip Richardson, M.P., founder of the firm of Wigham Richardson and Co., shipowners, and closely associated with the firm of Swan, Hunter and Wigham Richardson, shipbuilders, of Wallsend, has been honoured by the Government of the Greek Republic when he was the recipient of the Greek Maritime Medal, which was accompanied by the Diploma of Honour. These are the highest distinctions offered for services rendered to the Greek Mercantile Marine.

Two well-known figures in this district have been removed by death. Mr. Percival Burnip, who was a prominent personality in the coal and timber industries, died after a long illness on December 3rd. He was a member of the firm of Bessler, Waechter, Glover and Co., Ltd., Newcastle, and was an ex-chairman of the North-East Coast Coal Exporters' Association. The other gentleman, Mr. Samuel T. Harrison, was a victim of the November gales, when he was blown down and received injuries from which he never recovered, dying on December 6th. For the long period of 47 years Mr. Harrison was in the service of the North-Eastern Marine Engineering Co., Wallsend, retiring from the secretaryship of the company a few years ago. He was an ex-mayor of the Borough of Wallsend.

Making Safe Canada's Coasts and Waterways.

Important Work of Department of Marine and Fisheries. Many Ingenious Signal Devices.

With regard to shipping and navigation, particularly in respect to equipping her coasts with danger signals for the protection of mariners, Canada stands in a unique position among the nations of the world. While inland navigation in most maritime countries is relatively speaking much less important than the sea-borne carrying trade, that of the Dominion equals in significance her ocean traffic. As a result of the volume of this fresh-water shipping it is incumbent on the Government of Canada to maintain watch and ward not only over Canada's three sea-girt coasts, but also throughout her many lakes and rivers, including her share of the Great Lakes system which is one of the international water highways of the world.

The work entailed is enormous. Every detail brings its own big responsibility—for instance, the question of lights and lighting, light-ships, gas buoys, whistling buoys, and lanterns. The amount of lighting fuel is no small item, but it is to be remembered that the conservation of oil and gas used in the innumerable buoys strung thousands of miles on end to flash their warnings to the mariners has been carried by the Department of Marine and Fisheries to a fine art, and has brought into being many ingenious devices.

Viewed from the deck of a steamer, a gas buoy on the St Lawrence or on the sea-coast may not appear to be of any great size, compared with its surroundings. However, the coast buoys actually range in weight from 7 tons to 19 tons, and the river buoys, like those around Quebec, are from 6 to 8 tons and are some 9 feet in diameter.

There are three systems of gas buoys. The first is known as the oil-gas or "pintsch" system. The gas is purchased from the factory in steel containers, 9 inches in diameter and 6 feet long, and is at a pressure of 1,500 pounds to the square inch. Under this pressure the gas is liquid. When a buoy is to be charged with gas, a hose is connected from the steel container to the body of the buoy, and by turning a tap the gas is allowed to expand in the buoy until a pressure of 150 pounds to the square inch is obtained. Thus charged, the buoy is ready for five months' service.

In the second system acetylene dissolved in acetone is used. The acetylene acetone is purchased from the factory in steel containers in various sizes ranging from 100 pounds to 1,200 pounds. Containers of appropriate size are inserted into corresponding pockets in the buoy, and one or more containers may be used in each buoy according to the requirements of the locality. In respect of power of light required and the duration of time, the river buoys are equipped for the entire season and the coast buoys from 12 to 15 months.

In the third system carbide (calcium) is introduced into the buoy. The buoy is so designed that when placed in the water, water in suitable quantities enters the carbide chamber, attacks the carbide, and generates acetylene. According to requirements, the charges of carbide are made to last from 9 to 15 months.

Lanterns are used in all the three systems of buoys, and here it is that the Department's conservation policy is much in evidence. The lanterns are equipped with burners suitable to the gas used, and lenses magnify the power of the light evolved. By a device similar to that in a domestic gas meter, the supply of gas is cut off at pre-determined intervals. These intervals are varied according to local requirements, and a further saving is effected through the storage of gas in such large potential quantities in small structures.

Another gas-saving device of particular interest is known as the sun valve. This clever invention in effect causes the sun to light and turn off the gas in the buoys without any other aid. Advantage is taken of the expansion of metals under the heat of the sun, the arrangement being such that, as certain metal connecting rods contract or expand, valves which regulate the gas are opened or closed. Thus the gas supply is turned off during daylight hours which results in a large saving, especially in northern latitudes.

WM. SIMONS AND CO., LTD., RENFREW.

The following is a list of vessels constructed by the above firm during the year 1928:—

Vessels Constructed.	Tonnage.	I.H.P.	Owners.
Cutter Suction Hopper Dredger	2300	3500	Colonial
Dredger	1379	1165	,,
Hull for Dredger	508	—	,,
Engines	—	3950	,,
Grab and Suction Dredger ...	90	250	,,
Dredger	954	850	,,

Besides the above, a large quantity of Dredging Machinery was also supplied during the year.

Liverpool and Birkenhead Dock Works.

Dock Engineer's Report.

The general state and progress of the dock works at Liverpool and Birkenhead, for the year ended 1st July, 1928, are given in the annual report by Mr. T. L. Norfolk, Engineer-in-Chief, as follows:—

LIVERPOOL DOCKS.—NEW WORKS.

GLADSTONE DOCKS: GENERAL SCHEME.

The Gladstone Dock system was opened by His Majesty King George V. on the 19th July, 1927, since which date the system, generally, has been placed in commission.

Certain subsidiary works and additional sheds, not then completed, have been in hand during the year, as follow:—

130-ft. River Entrance Lock.—The dredging of the fairway to the River Entrance has been completed, 100,942 tons of material having been removed during the year, making a total of 1,118,166 tons since the commencement of dredging.

Gladstone Dock.—The wind-screen on the West side of the River Entrance Island, and the wind-screen and dwarf wall on the portion of the River Wall South of the Battery, have been completed. Similar work on the portion of the River Wall North of the Battery is approaching completion.

The dredging of the Northern end of the dock has been completed, 1,175,240 tons of mixed spoil having been removed during the year, making a total of 1,408,970 tons since the commencement of dredging in the dock.

The single-storey ferro-concrete shed on the North quay has been completed and is ready to be placed in commission.

The single-storey ferro-concrete shed at the North end of the West quay, the construction of which was begun during the year, is making good progress. The foundation piling has been completed, and the concreting of the foundation beams and slabs for the floor is in hand.

Gladstone Branch Dock No. 2.—The dredging of the North side of this dock has been completed, 327,369 tons of boulder clay, roach and rock having been removed during the year, making a total of 483,849 tons since the commencement of dredging.

Four additional 20-cwt. electric roof cranes have been ordered for the North and South Sheds—two on the roadside of each shed, and the construction of these is proceeding at the contractor's works.

General.—Additional hand lowering jiggers have been provided at three of the four treble-storey sheds, and fire equipment has been installed at all these sheds.

An electric passenger lift has been installed at the East end of the treble-storey shed at the North side of Branch Dock No. 2 for the convenience of the berth-holders (The Oceanic Steam Navigation Co., Ltd.) who have provided offices, etc., in the shed.

A 60-ton road and rail weighbridge has been provided at the South end of the East roadway, and a 30-ton road weighbridge at the North end of the same roadway.

A new district traffic office, including accommodation for weighing materials, and an office for the Customs' water guard, have been provided to the Southward of Branch Dock No. 1.

The shore road North gateway has been widened to accommodate increased traffic.

The total quantities of excavations removed, concreting done and material dredged during the year on the whole of the Northern extension works, were as follow:—

Excavations	... ...	50,421 cub. yds.
Concreting	... ...	28,476 cub. yds.
Material dredged	... ...	1,603,551 tons.

NEW IMPOUNDING STATION, NORTHERN SYSTEM OF DOCKS.

The Board have authorised the erection of a new Impounding Station on the river wall to the Westward of the Hornby Dock, for the purpose of serving the impounded Northern system of docks. The construction of the discharge culvert has been commenced and an order has been placed for the necessary pumping machinery, which is to be electrically driven.

BRUNSWICK DOCK RIVER ENTRANCES.

A steel jetty, consisting of two parallel lines of steel sheet piling with timber bracings between them, is being constructed on either side of these entrances, for the purpose of counteracting the continued encroachment of the Pluckington bank on the fairway. The work, which is of an experimental character, is being done in stages so as to gauge its success, or otherwise, in accomplishing the end in view. Steel piles released from the Gladstone Dock works are being utilised for the purpose, and are being so fixed that they can be readily removed if found necessary.

The work of pile driving was commenced at the North Jetty on the 9th May, and at the South Jetty on the 11th May, 1928, and up to the 1st July, the following lengths had been driven:—

North Jetty—On North side, length driven 84-ft. 5-in.; intended length 500-ft. On South side, length driven 94-ft. 10½-in.; intended length 500-ft.

South Jetty.—On North side, length driven 83-ft. 6-in.; intended length, 500-ft. On South side, 74-ft. 1-in.; intended length, 500-ft.

EXTENSION OF SOUTH DINGLE JETTY.

With a view to providing additional accommodation for the berthing of oil tank steamers, the Board have authorised the extension of this jetty for a distance of 198-ft. to the Southward, making the total length of the jetty 700-ft. The work is in hand.

REPAIRS AND MAINTENANCE, ETC.

Gladstone Graving Dock.—The reconditioning of the pumping machinery at this dock was so far completed as to allow of the docking of a vessel on the 5th December, 1927, and the dock has been fully available for use since that date. The contractors completed their work on the engines in May, 1928.

The mechanically-operated bilge blocks provided for this dock were brought into use on the 5th December, 1927.

Hornby Dock.—Extensive repairs have been carried out to the paving in the roadway on the East side of this dock, leading to the Gladstone Dock system.

Various improvements are in hand at the West shed, including the provision of continuous sliding doors on the dock side.

Brocklebank Branch Dock.—Two single chain grabs for handling ore have been provided for the 3-ton electric gantry cranes on the South side of this dock.

Canada Lock.—The outer gates of this lock were severely damaged during a gale on the night of the 28th/29th October, 1927. They were removed for repairs and while the repairs were in hand the intermediate gates were moved into the position of the outer gates. The work was completed and the gates stepped into their respective positions again as follows:—middle gates 23rd January, 1928, outer gates 26th January, 1928.

Canada Branch Dock No. 1.—Railway facilities have been provided in the roadway on the South side of this dock.

Huskisson Branch Docks.—Railway facilities have been provided in the roadway on the North side of Huskisson Branch Dock, No. 2, and two 30-cwt. electric roof cranes are being provided at the North shed, Huskisson Branch Dock, No. 3.

Additional railway facilities have been provided on the East quay of Huskisson Branch Dock, No. 1.

Love Lane Warehouse.—One half of the roof is being recovered with asbestos-covered corrugated sheeting. The work is approaching completion.

Princes Graving Dock.—The Board have ordered electrical pumping machinery to be provided at this dock in lieu of the existing steam pumps. An order for the new pumps has been placed with contractors.

Chester Basin.—This basin was conveyed to the Corporation of Liverpool on the 26th October, 1927. The Corporation have requested the Board to construct a wall across the entrance and the work is in hand.

Manchester Dock.—The Board have ordered this dock to be filled in and a wall to be constructed across the entrance. The work of filling, which commenced on the 26th April, 1928, is being effected by means of excavations from the Mersey Tunnel works.

Canning Pierhead.—The shed on the Canning Pierhead, occupied by The Liverpool and Glasgow Salvage Association, which was destroyed by fire on the 17th June, 1927, has been rebuilt. The parties took possession of the new shed on the 31st January, 1928.

Dukes Dock.—The shed at the South-west corner of the Dukes Dock has been re-roofed and otherwise repaired and let, together with the adjoining shed.

Parkhill Estate.—An arrangement has been made with the Corporation of Liverpool for the stopping up as a public street, of the portion of Dingle Lane running Westward from the South end of Dingle Road. A portion of the Board's land in Dingle Road, at the North-east corner of the Parkhill Estate, has been conveyed to the Corporation in exchange for this portion of Dingle Lane. The Board's boundary wall in Dingle Road has been set back to suit the arrangement.

Gales.—Extensive damage was caused to sheds and other dock works by heavy gales on the night of the 28th/29th October, 1927, the night of the 10th/11th February, 1928, and the night of the 16th/17th February, 1928. In the case of the gale on the night of the 10th/11th February, the wind reached a maximum velocity (as recorded at Bidston Observatory) of 104 miles per hour. All the damage has been made good.

BIRKENHEAD DOCKS.—NEW WORKS.

New 80-ft. River Entrance Lock, Alfred Dock.—The construction work is now complete and the lock flooded. Temporary dams, dolphins, gantries, sheds, rails, etc., have been removed and the ground on both sides of the lock levelled.

The three pairs of gates are in position and the operating machinery for gates, sluices and capstans have been completed and connected to the mains. Three new capstans have been provided and mooring posts have all been fixed as well as electric standards and beacons for lighting the quays. Huts, lever boxes, etc., have been provided for use of the dock gatemen, and the dock master's office has been reconditioned.

Dredging is in progress in the river in order to deepen the approach to the new lock.

Quantities of work done:—

	During the year. cub. yds.	Since commencement. cub. yds.
Excavations	36,947	142,238
Concreting	12,648	105,528

NEW 80-FT. INNER PASSAGE, ALFRED DOCK.

North Wall.—Excavations have been carried out at the North-east bullnose to a depth of 15-ft. below bay datum, and the concrete and coping over the whole knuckle completed to finish level. Old masonry in North Wall has been excavated and underpinned, and the intermediate gate recess of the old 30-ft. lock excavated and faced with concrete to the level of the surface of the nose-end lifting gear pit. The gate recess and gate operating machinery pit have been completed, and the North-west knuckle excavated, underpinned, and completed to coping level. The capstans and capstan beds at the North-east and North-west knuckles, old pipe trenches and clough shafts have been renovated.

Body of Passage.—All material between the caisson sills has been excavated and the concreting of the floor, sills and gate platform completed. The granite sills and quoins are all dressed complete.

The swing bridge over the old locks has been removed and a temporary timber bridge provided to carry all classes of traffic.

New Bridge over Passage.—The erection of the turntable is well advanced. The parts of the bridge machinery are being delivered and the construction of the superstructure is approaching completion at the contractor's works.

Old Masonry, East of East Caisson Sill.—The granite face has been removed from the South section of old masonry and 9,607 cubic yards of material has been excavated. The East closing dam has been relieved on to the old masonry core at the South end.

South Wall of Passage.—The South wall has been concreted and completed to coping level for a length of 280-ft. The pits for gate machinery and bridge slewing and tail end lifting gear have been completed, and the filling at the back of the South wall brought up to a level of 32-ft. 1-in. above bay datum.

Machinery.—All gate and sluice operating machinery is completed. The gates have been completed by the contractors on a temporary site on the North side of the West Float. They will be launched and fixed in position when the passage is ready to receive them.

Quantities of work done:—

	During the year. cub. yds.	Since commencement. cub. yds.
Excavations	27,948	66,871
Concreting	13,438	36,119

REPAIRS AND MAINTENANCE, ETC.

West Float.—Preparatory work has been undertaken in connection with extensive repairs to the roof of the North-east shed.

One of the sheds at the West end of the North side of West Float has been let as a steam joinery works, and extensive roof and door repairs have been carried out.

Birkenhead Grain Warehouses.—New shutes are being supplied in certain positions.

Mortar Mill Quay, East Float.—The work of widening the shed on this quay was completed on the 8th September, 1927, and the extension duly handed over to the berth-holders.

Egerton Dock.—Improvements have been carried out to the floor of the North shed by the removal of out-of-date railway tracks and traversers.

Shore Road.—Extensive repairs to the railway tracks and paving over the whole length of Shore Road have been authorised and preparatory work has been put in hand.

Woodside Floating Roadway.—The top section of this roadway has been overhauled and repaired, and preparatory work has also been commenced on the scheme of reconstruction of the whole roadway.

MERSEY CATTLE WHARF.

Woodside Lairage.—The absorption type refrigerating machines in the chill rooms at this lairage have been replaced by more up-to-date plant working on the ammonia compression system, and electrically driven. The contract for the work was placed on the 24th October, 1927, and the new plant was installed and operating by the 19th March, 1928. The electric energy for the plant is being obtained from the Birkenhead Corporation. The current for the general lighting system of the lairage is now being obtained from the Birkenhead Corporation instead of being generated by the Board's plant as formerly. The latter plant has been disposed of.

Wallasey Lairage.—The old timber-loading staith at No. 4 shed has been reconstructed in concrete and similar work on the staith at the Glass House is in hand.

MERSEY TUNNEL.

(Under Construction by the Mersey Tunnel Joint Committee.)

The following changes in the positions of the entrances to the tunnel at Liverpool and Birkenhead have been authorised by Parliament in the Mersey Tunnel Act passed on the 26th April, 1928:—

Liverpool.—The main entrance is to be placed in the Old Haymarket, instead of at the junction of Whitechapel and Stanley Street as originally proposed. The second entrance in New Quay is not altered.

Birkenhead.—The main entrance is to be placed in Albion Street at its junction with Market Place South, instead of in Bridge Street as proposed in the scheme authorised by the 1927 Act. The second entrance at Rendel Street, authorised by the last-named Act, is not altered.

Progress of Work.—The bottom heading of the tunnel under the Mersey has been completed and a public ceremony was held in connection with the break-through on the 3rd April, 1928. Headings are in hand between the shafts on each side of the river and the respective intended entrances.

A portion of the full-sized 44-ft. diameter tunnel is also in hand on the Birkenhead side under Pacific Road between the river wall and the Morpeth Branch Dock, and excavations have been commenced on the 44-ft. tunnel beyond the river wall on both sides of the river.

CONSERVANCY.

North Wall Light.—The new lighthouse building, etc., designated the "North Wall Light" (erected on the North side of the New River Entrance Lock, Gladstone Dock) was brought into commission in July, 1927. The building is fitted with an automatic acetylene light and an electrically-operated siren fog signal.

Taylor's Bank Revetment, Extension Westwardly.—No work has been done on this revetment during the year.

Crosby Training Banks.—The following material has been deposited in connection with the construction of the "Burbo Training Bank"—

	Clay tons.	Stone tons.
Total for the year	26,274	313,235
Total since commencement of the work	1,346,151	809,638

The bank has been brought up to the finished level for a length of 13,500-ft., and work is in hand over a further length of 1,150-ft.

HOPPERS, ETC.

Nos. 32 and 33 steam hopper barges have been made suitable for carrying stone for revetment works.

The grab dredger "Secunda" was sold to a firm of shipbreakers on the 9th March, 1928.

DREDGING AT THE BAR AND SHOALS IN THE QUEEN'S AND CROSBY CHANNELS.

The sand pump dredgers "Leviathan," "Coronation," "Burbo," "G. B. Crow," "Brancker" and "No 16," have removed quantities of sand from the Bar and shoals in the Queen's and Crosby channels during the year ended 1st July, 1928:—

	Bar. tons.	Queen's Channel. tons.	Crosby Channel. tons.	Total tons.
"Leviathan" ...	825,600	10,000	710,000	1,545,600
"Coronation" ...	708,750	429,520	368,710	1,506,980
"Burbo" ...	350,420	1,381,450	1,236,270	2,968,140
"G. B. Crow" ...	321,250	743,800	638,300	1,703,350
"Brancker" ...	198,000	2,609,900	665,500	3,473,400
"No. 16" ...	23,100	134,950	109,350	267,400
Total ...	2,427,120	5,309,620	3,728,130	11,464,870

The quantity of sand removed from the Bar since the commencement of dredging there in 1890 is 94,463,570 tons, and from the shoals in Queen's and Crosby Channels 317,635,750 tons, making a total of 412,099,320 tons.

The sand pump dredgers have worked part of their time at the Brunswick River Entrances, Herculaneum Dock Entrances, South Dingle Jetty, and at the entrance to the Garston Channel. The total quantity of sand so removed, during the year, was 4,218,250 tons.

No dredging has been done by bucket dredgers at the Brunswick Entrances during the year.

Mr. Thomas M. Newell, who was appointed Engineer-in-Chief as from the 2nd March, 1913, retired as from the 2nd July, 1928, and Mr. T. L. Norfolk was appointed to, and took up that position as from that date.

Book Review.

PORT STUDIES.

With Special Reference to the Western Ports of the North Atlantic. By Brysson Cunningham, D.Sc., B.E., M.Inst.C.E., etc. (Chapman and Hall, 25s.).

This, the latest work of Dr. Cunningham, is a companion volume to Cargo Handling at Ports, Port Administration and Port Economies, and consists of a compendium of the information collected by that well-known authority on docks and harbours during a series of visits during the last five years to the American ports of the North Atlantic.

There appears to have been until recent years a somewhat unjustifiable conservatism and indifference on the part of British Port Authorities to the practices at other British and foreign ports; not so much, it is admitted, as to the facilities and attractions offered to shipping and trade of rival and other ports, but more concerning the economic working—that is to say, the internal arrangements and operations of such ports.

The author therefore has written the present volume feeling that a review of methods prevailing at American ports respecting the reception and dispatch of shipping and cargoes as compared with British practice, with a consideration of their advantages and drawbacks, could not fail to be instructive to those in this country who are concerned in port and shipping affairs.

There is no doubt that there is much to be learnt from an investigation of alternative methods, whether they be concerned with accommodation, construction, cargo handling development, or with operation, management and administration.

Such study of diversity of operations is frequently suggestive of possibilities of emulation or improvements on the same lines or the adoption of the same basic principles with modifications to suit the possible different circumstances and the purpose in view.

An attempt accordingly has been made by the author to discuss the practices at the various ports visited, with special reference to their working conditions.

Arising out of certain charges that operation delays at British ports were due to the absence of modern cargo handling appliances, the London Chamber of Shipping appointed a committee of their members for the purpose of investigation. In 1923 and 1924 an extensive tour of the British ports was undertaken, and a report was issued on the conditions prevailing at some thirty ports, but without, however, finding any very substantial grounds for the allegations referred to. At any rate, there appears to be a desire now on the part of Port Authorities to familiarise themselves with the arrangements, equipment and management of the more important ports of the world.

In the United States of America, the War Department, in conjunction with the Shipping Board, have commenced an exhaustive investigation of facts and economic conditions relating to the ports of that country. Much of the work has been completed, and as a result a publication has been issued entitled " Port Series," which deals in turn with each of the ports of the United States seaboard.

In addition to the author's own extensive notes, data and reflections gained from personal inspection and observation of the ports reviewed, he has availed himself largely of the extensive and detailed information contained in this series. The ports dealt with by Dr. Cunningham are as follow:—New York, Philadelphia, Baltimore, Boston, and the Canadian ports of Montreal and Quebec. These ports, besides being generally described as to geographical conditions, are dealt with under the heads of: The Port Approaches, Tides and Currents; Commerce and Shipping; Berthage Accommodation; Port Terminals; Pier and Quays and Construction thereof; Port Development; Cargo Handling and Equipment; Grain Elevators; Coal Handling; Oil Bunkering; Cold Storage Arrangements; Railway Systems; Shipbuilding; Graving Docks; Ship Repair Facilities; Port Administration, and Comparison with British Ports.

Each of these heads of description contains much useful information regarding the subjects quoted, illumined by the author's commentary treated in his usual lucid and interesting style. In the case of the Port of New York it is brought to the reader's notice what remarkable endowments Nature has conferred upon the locality, with its naturally sheltered, easily accessible and commodious harbour, and a moderate tidal range and equable climate.

It should be noted how the small tidal range—the mean being about 4.7-ft.—has obviated the necessity of enclosed docks and all their complicated accessories of entrance locks, gates, bridges and machinery; the general type of berthing accommodation being in the case of this port, and, in fact, in those of each port with the possible exception of Quebec, of the pier type, built more or less at right angles from the shore. Some of these piers—the older ones—have been increased in length without it being possible to provide them with widths commensurate with their increase in length, resulting, unfortunately, in cramped conditions and congestion. The various means adopted for overcoming these difficulties are explained.

Pier and quay construction is very fully dealt with, and the general type, forms and details of construction are explained and illustrated by excellent drawings and photos which cannot fail to be instructive. In the case of New York, soft mud lies to such a depth that in many instances a sufficiently firm foundation can with difficulty be obtained with piles as much as 90-ft. in length. The resulting piers are of necessity somewhat light and flexible, and provide much food for thought when comparing with the piers usually constructed and thought necessary in the ports of the British Islands. The great use of timber for this work in the American ports is brought to notice.

As regards Warehousing Accommodation, it is shown how most of the sheds on the piers are single and double storey, and how, in Philadelphia, there is a deficiency of such accommodation, which is true to some extent in the Port of New York.

The cargo handling methods and equipment in general use at the ports under review are very carefully gone into and described by the author. He discusses the process known as " Burtoning," which is a combined use of ships' gear and a quayside pulley—a variation, by the way, of the practice in England of employing two ships' beams, or a boom and a crane, which is called the Union Purchase. The special advantages of Burtoning in certain cases are pointed out, and the use of this system is suggested for various conditions obtaining in British ports. Its limitations, moreover, are brought to notice, and it is observed how, in particular instances in American ports, its adoption is condemned by the War Department and Shipping Board, and the use of a certain number of quay cranes advocated.

The export grain trade is an important one in the majority of the ports under consideration, and the grain elevators and silos in use for the discharge and export of grain are fully described and detailed. Coal handling for export, again being important work at the ports considered, is gone into in extensive detail, and the high development of the appliances in use; and the author's descriptions thereof should prove of value and interest to those concerned with this class of operation.

Dr. Cunningham concludes his work with an epilogue, in which he sums up the impressions gained from his tours, and deduces for the benefit of the reader who has followed his detailed descriptions and comments on the ports which he visited and their working, such conclusions as are permissible from the facts of the case in comparison with methods and practices adopted in this country and in Europe.

At first sight it certainly appears that the situation is largely one of marked contrasts rather than of single comparison. The writer, therefore, first of all eliminates the divergencies arising from inherent physical, geographical, commercial and economic causes, and then proceeds to show how a constructive and useful comparative port study can be made as between British and North American ports. The vexed question of the limiting tidal range for the natural tidal working of ports—without recourse to enclosed docks and their expensive accessories—is discussed, this question being really the most outstanding point of difference between the ports of Britain and America.

Dr. Cunningham has provided a book excellently illustrated with drawings and photographs, which should be of immense service to Port Authorities, Port Officials, Stevedores, Shipowners, Engineers, and all whose business lies with ports and docks; and we do not hesitate to recommend this work to all those engaged in the sphere of transport work.

THE CAR FERRY " SEA TRAIN."

The New Orleans Port Commission have extended to the Overseas Railway Company an invitation to berth the car ferry " Sea Train " at the foot of Canal Street on December 29th for inspection by the public. This vessel is now en route to New Orleans from her builders in England, and will be used for transporting full trains of cars from New Orleans to Havana, Cuba.

CONTRACTS FOR WATERFRONT CONSTRUCTION.

The Board of Commissioners of the Port of New Orleans on December 13th authorised a contract with the Virginia Bridge and Iron Company in the sum of $25,326 for furnishing and erecting the steel framing for the rear extension of the St. Andrew Street wharf, on which approximately $500,000 is being spent in reconstruction and enlargement. To date the Board have contracted for wharf work and firewalls at a cost of $131,918.48; creosoted piles $35,860; creosoted timber $35,685; a total, including steel framing, of $228,798 contracted for on this project to date.

At the same meeting the Board authorised purchase from the Kinnear Manufacturing Company of ten new steel rolling doors for the use of the Cuyamel Fruit Company at the Desire Street shed, cost $9,382, and purchase from the same company of 300 interlocking curtain slats and end locks for $1,440.

MARCONI
BEACON STATION

MARCONI beacon apparatus has been installed at Start Point Lighthouse for the Corporation of Trinity House.

THIS installation has a power of 500 watts and is operated on a wavelength of 1,000 metres, with the call sign GSM. The whole equipment is automatically controlled by a master clock for transmitting groups of interrupted continuous wave signals at pre-arranged intervals.

The completion of the Start Point transmitter means that cross-bearings can now be taken by ships fitted with wireless direction finders using the stations at Round Island, Casquets and Start Point as their fixed points. A sequence of bearings can be obtained, whenever required, by navigators who can be sure of their position, right up the Channel, in any weather.

Accurate direction finding bearings may be expected up to about 100 nautical miles, under normal atmospheric conditions, from these particular beacons.

Start Point is the seventh Marconi Beacon installation to be installed round the British coasts. Six more are to be installed in the near future, and similar stations have been ordered for other countries.

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VAR GOD ARE ROPA "THE DOCK & HARBOUR AUTHORITY" NAR ANNONSORERNA TILLSKRIFVAS.

Belfast Harbour Notes.

Mr. R. E. Herdman, D.L. (Chairman) presided at a meeting of the Belfast Harbour Board.

The Harbour Master reported that 267 vessels arrived at the port during the period from the 18th November to 1st December, as follows:—Coastwise and cross-Channel, 244; foreign, 21; non-trading, 2. The total tonnage of the vessels which arrived from the 1st January to the 1st December, was as follows:—Coastwise and cross-Channel, 2,112,350 tons, an increase of 20,079 tons over the corresponding period of the previous year; foreign 599,836 tons, a decrease of 42,280 tons; non-trading 54,812 tons, a decrease of 10,838 tons; total, 2,766,998 tons, a decrease of 33,039 tons.

The following proposals were adopted:—The removal of the Belfast Water Commissioners' office from the North end of Queen's Quay to a site in the vicinity of the South side of Abercorn Basin.

The removal of the berthing and traffic office, now at the North end of Queen's Quay, to a site at the West end of South Quay, Abercorn Basin.

The removal of the 10-ton steam crane from the South end of Queen's Quay to the East Quay of Abercorn Basin, and extension of the crane lines for a distance of 90-ft. towards the North.

The General Manager reported that the collector of Customs and Excise had forwarded the sum of £1 as a reward to Harbour-Constable Samuel Doherty for the detention, on the 7th July last, of undeclared silk goods at Dufferin Dock, and permission was granted to Constable Doherty to accept the reward.

Reference having been made to the question of the acceptance of gratuities, the matter was discussed by the Traffic and Navigation Committee, and Mr. Watkins (General Manager) drew attention to the notice issued to the Board's employees on the 1st December, 1926, viz.:—

> **"The employees of the Commissioners are strictly forbidden to ask for or accept any gratuity or gift, either as a Christmas-box or otherwise, or any fee or reward in respect of anything done by virtue of their office or employment, without the sanction of the Commissioners. Any employee infringing this order will be liable to instant dismissal."**

It was decided to re-issue this notice.

The Chairman made reference to the death of Mr. David Moore, a former assistant-secretary to the Trust. Mr. Moore retired in 1915, after having served the Trust for a period of almost 50 years, and he (Mr. Herdman) was sure they would not wish the occasion to pass without his expressing, on his own behalf and on their behalf, their deep regret at the loss of one who had given such long and valuable service to the Trust.

Under the Government derating scheme the Belfast Harbour Commissioners are granting a rebate of 50 per cent. in the harbour dues on exports of live stock, dead stock (carcases only), cattle, sheep, and lambs, pigs, potatoes, linen, and cotton goods and linen and cotton yarn; also on imports of tow, hemp, and flax.

There will be a similar relief on harbour rates on vessels constructed in the harbour, as well as in laying-up rates and rates for use of 120 tons electric crane in respect of vessels fitting out or undergoing repairs in the harbour.

These facts are very interesting in view of statutes given below relating to the trade of the Port of Belfast.

The official return of imports and exports through the port of Belfast for the nine months ended 30th September last furnishes, as usual, a useful barometer of local trade and industry. The tonnage returns have kept up remarkably well, and in this respect Belfast is favourably placed compared with many of the large ports. Coal, which is the most important indicator with regard to industry, shows a falling off, the imports for the nine months totalling only 904,880 tons, as compared with 977,102 in the same period of 1927. That is a decrease of about 7½ per cent., and is, doubtless, due largely to a number of industrial concerns using less.

With regard to the linen trade the exports of linen goods declined from 27,470 tons to 25,125 tons—almost 8 per cent. Flax imports declined from 17,271 tons to 12,615 tons, a decrease of over 25 per cent. Yarn imports fell from 4,732 tons to 2,917 tons, but the decrease in yarn exports was small, from 3,698 tons to 3,550.

Of cottons, 8,858 tons were exported, this being an increase of a little over 1,000 tons, while imports of cottons were almost the same as in the corresponding period, 12,855 tons.

Bearing upon the shipbuilding trade, the imports of iron and steel (sheet, plate, wrought and bar) during the nine months totalled 155,374 tons. This is a slight decrease from the figures for the corresponding nine months, when the total was 162,571 tons. There was an increase in steel castings from 7,487,tons to 13,158 tons. Exports of machinery fell from 10,277 tons to 7,769 tons.

There was a slight increase in tobacco exports, the total being 2,338 tons. Whiskey exports are now almost a normal quantity, but the total, 2,824 tons, was slightly more than in the 1927 period. Almost 6,309 tons of paper were exported, while imports totalled 12,347 tons.

In regard to stock and produce, exports of cattle showed an increase from 60,503 to 70,205 head, a very substantial increase indeed. An increase even more substantial is noted in sheep—from 36,707 to 53,004 head. Pigs, on the other hand, declined from 8,425 to 4,681. Apparently the pig export boom has not been maintained. In compensation, however, bacon exports rose from 4,624 tons to 5,897 tons, and hams from 1,968 tons to 2,677 tons. The number of horses exported was 1,804 as compared with 2,117 in the corresponding period.

Egg exports showed a slight decline, from 15,841 tons to 14,937 tons, but fowl exports increased from 2,787 tons to 3,642 tons.

Butter exports dropped from 1,551 tons to 1,116 tons, while butter imports rose from 1,969 tons to 2,050 tons.

There was a big increase in exports of potatoes—from 109,928 tons to 198,210 tons. Grass-seed exports also showed an increase—from 8,739 tons to 11,727 tons. Imports of feeding meal rose from 13,344 tons to 17,534 tons.

Wheat imports fell from 63,028 tons to 41,022 tons, while, strange to say, in face of such a fall, flour imports also decreased, the total being 55,963 tons, as compared with 66,089 tons in the corresponding period. Indian corn imports totalled 180,875 tons, a decrease of over 33,000 tons.

Of margarine, 2,474 tons were imported as compared with 2,396 tons. Of sugar, the total import of 23,232 tons—a small increase, and of tea, 3,744 tons—also a small increase.

Fuel oil imports were 18,868 tons, petroleum 14,344 tons and motor spirit 37,363 tons.

Correspondence.

THE BRITISH STEEL INDUSTRY. SAFEGUARDING CONDEMNED.

To the Editor of "The Dock and Harbour Authority."

Sir,—Mr. R. Storry-Deans, M.P., speaking in London on 4th December, said that if 2,500,000 tons of the steel at present being imported were made in Britain, this would give employment to 100,000 extra workers, and would also mean the consumption of 8,000,000 more tons of coal.

If these figures are correct, they explain why Britain is not competitive. Both figures are a long way higher than either the Continental or American practice.

Let me make a little calculation. The bulk of the 2,500,000 tons at present imported consists of steel billets, strips, bars, joists and plates, the average price of which does not exceed £7 per ton delivered here, making a total of £17,500,000.

Mr. Deans says if this steel were made in Britain the labour cost would be 100,000 men at £156 each, making a total of £15,600,000—that is nearly £6 per ton for wages only, leaving £1 per ton to cover cost of raw materials, oncost and overhead charges!

When it is remembered that it only requires 1,250,000 tons of pig-iron (plus scrap) to produce the 2,500,000 tons of steel, the figure of 8,000,000 tons of coal is abnormally high.

If this is the case for Safeguarding, then it has completely broken down.

These alarming figures have been confirmed by the Steel Makers themselves in a printed leaflet issued recently on their behalf by the Empire Industries Association, London. They have also been confirmed by the President of the Board of Trade. If it costs £6 for labour and requires about 4 tons of coal to produce one ton of steel then that is all the more reason why British consumers must have Free Trade.

Britain has an export iron and steel trade at present of over four million tons per annum. To retain this large export business she must have access to cheap sources of supply of the necessary raw and semi-raw materials.

I am, etc.,

Glasgow, 11th December, 1928. DAVID MACMILLAN.

SALVAGE WORK IN THE PORT OF HAVRE.

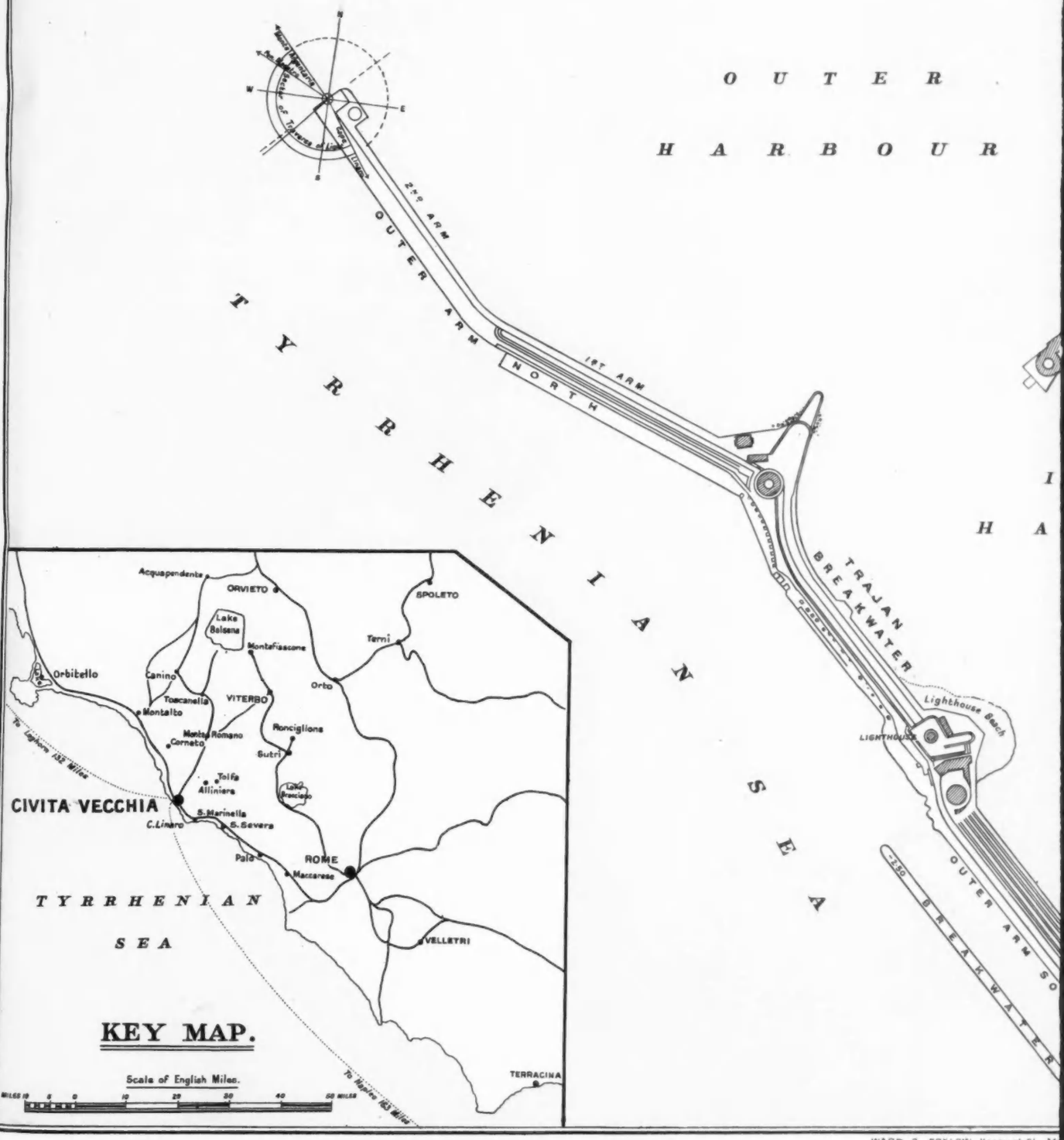
The British firm of Lindsay, Swan & Hunter, of Sunderland, is now successfully carrying on the salvage of the Chargeurs Renuis steamer the "Hoedic," which overturned in the Bassin Bellot on June 6th, while filling with water ballast.

During the past months divers and carpenters have been engaged in closing the hatches and as soon as this was done 16 pumps, lifting 6,000 tons of water per hour, began emptying the hull; it took a quarter of an hour before the ship began moving. Mr. Linsay is the engineer in charge of the salving operation and has at his disposal nine experienced divers and a crew of about 50 on board the salvage vessel "The Reclaimer." A small size replica of the "Hoedic," complete with every detail, had been built and sunk in a large tank representing the Bassin Bellot. Tests were first made on the miniature wreck before planning the successive stages of the refloating work.

The Marseilles Harbour Board had to face a task similar to that now carried on at Havre when the Corsica Mail boat, sunk in the Joliette basin was raised a little while ago. The Mail boat was sunk by red agitators who opened the sea cocks to avenge themselves of the Marseilles dock strike failure.

PORT OF CIVITA VECCHI

CAPTAIN OF THE PORT;— LIEUT. COLONEL SILVIO LOMAZZI.



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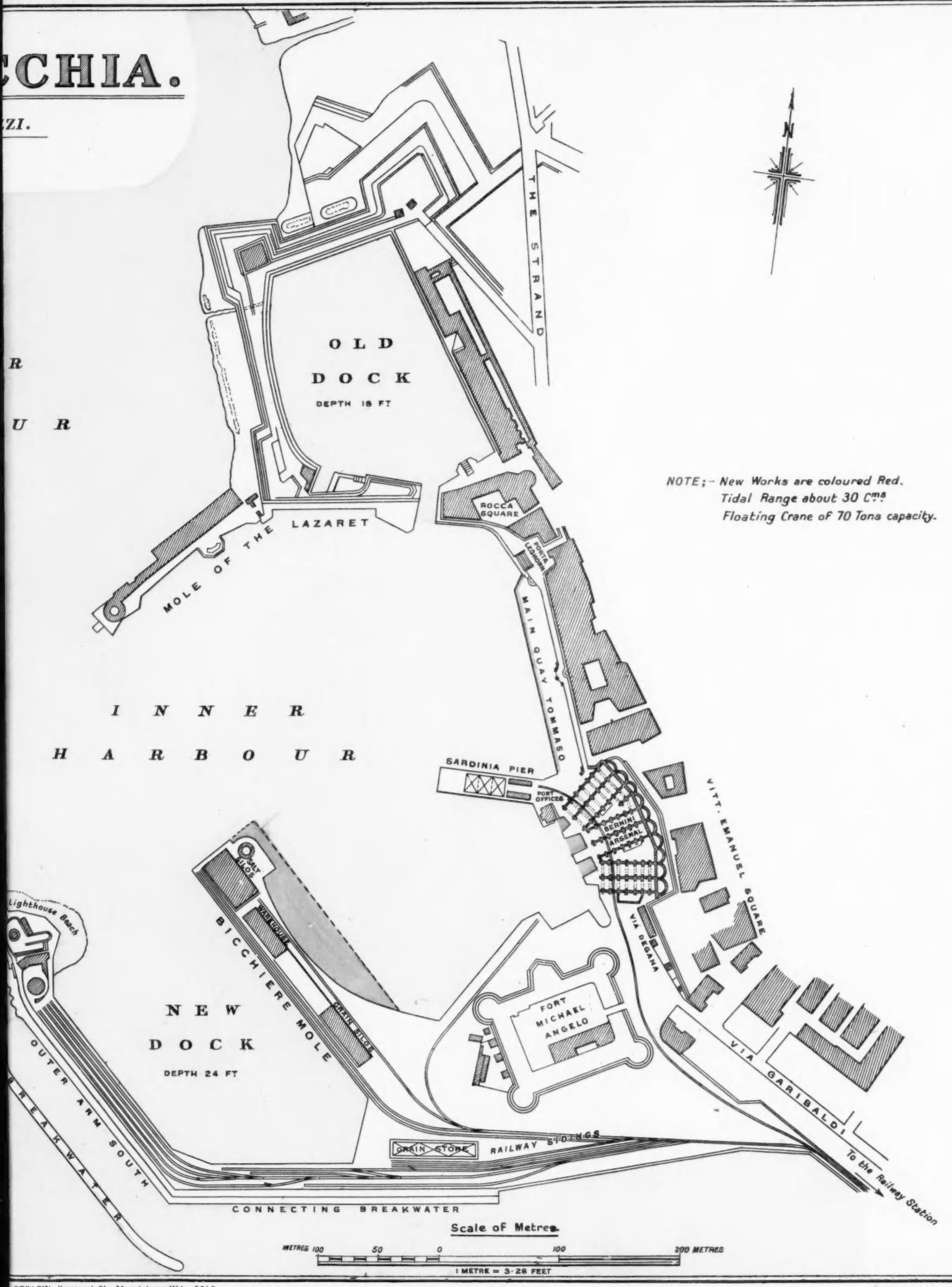

NOTE;- New Works are coloured Red.
Tidal Range about 30 Cms
Floating Crane of 70 Tons capacity.

Scale of Metres.

METRES 100 50 0 100 200 METRES

1 METRE = 3·28 FEET

FOXLOW. Harcourt St. Marylebone. W.1. 5249.